

MINI Cooper R60 Countryman



WORKSHOP SERVICE MANUAL

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Condition Based Service

MINI R55, R56, R57, R58, R59, R60 and R61



System functions

8 maintenance operations are performed by the Condition Based Service:

- Engine oil
- Brake pads, front
- Brake pads, rear
- Vehicle check
- Brake fluid
- Statutory vehicle inspection
- Pre-delivery check
- Diesel fuel additive until

For clarity, the maintenance operations with their intervals are shown first (valid for EURO vehicles). In particular countries the values for engine oil, for example, may differ.

<u>Scope</u> (calculated by)	<u>Interval</u>	<u>Starting value/interval forecast</u>		<u>Time reference</u>
		Distance [km]	Time [Months]	
<u>Engine oil</u> (DME/DDE)	flexible	DME: 30.000 DDE: 20.000 From 08/2010: 30.000	24 24	on-board date
<u>Brake pads, front</u> (DSC)	flexible	50.000	---	---



<u>Brake pads, rear</u> (DSC)	flexible	50.000	---	---
<u>Diesel fuel additive</u> (DDE)	flexible	200.000	---	---
<u>Vehicle check</u> (instrument panel)	fixed	DME: 60.000 DDE: 60.000	48 48	on-board date
<u>Brake fluid</u> (instrument panel)	fixed	---	24	on-board date
<u>Statutory vehicle inspection</u> (instrument panel)	country-specific	---	encodable	on-board date
<u>Pre-delivery check</u> (instrument panel)	fixed	---	1	on-board date

Important! The reference time for time-dependent maintenance operations is the on-board date

The on-board date is used for the display of escalation (green symbol, yellow symbol, red symbol). Furthermore, the on-board date serves as the basis to sort the maintenance operations in the display. The on-board date stops when the battery is flat or disconnected and must then be corrected in the vehicle. The on-board date **must** be correctly set before resetting the maintenance operations. Resetting is described in the general service information.

Maintenance operations coupled at the engine oil:

- Passenger compartment microfilter
- Spark plug
- Air filter
- Fuel filter (diesel fuel)

You will find the information on the respective couplings in the Engine oil service document.

Other maintenance operations:

- Vehicles built before 08/2010:
Toothed belt (diesel fuel): approx. 200,000 km.
- Vehicles built before 08/2010:
Poly-V belt (diesel fuel): approx. 200 000 km.

Key Service data

The concealed function for updating the key data is triggered as follows:

- Insert master key in the insertion slot
- Keep the central locking button pressed
- Change the terminal by pressing the START/STOP button
- Wait approximately 10 seconds (central locking button can be released)
- When the key data is updated an acoustic signal will sound

General information on Condition Based Service

Resetting a maintenance measure in the vehicle



Note: First perform the maintenance measure

A maintenance measure must only ever be reset **after** it has been performed.

Note: Perform a reset after instruction

The resetting process is interrupted if the time is exceeded or if a terminal is changed.

On the vehicle, maintenance operations can be reset at the instrument panel. Here, the availability of a service job is reset to 100 % (corresponding to new part). The availability is an internal computing value (not visible to the operator).

The following sequence must be observed if you are resetting with the trip distance recorder reset button:

- switch on terminal 15
- Press and hold the trip distance recorder reset button for 10 seconds until the 1st scope of maintenance work appears in the LCD display.
- The upper display in the speedometer is illuminated by a service symbol (e.g.: an oil can is the symbol for an oil change).

The lower display in the speedometer indicates the time or distance remaining until the next service (e.g.: 14000).

Scroll by repeatedly pressing the on-board computer button.

- To reset, press and hold the on-board computer button on the direction indicator/main-beam switch until "RESET" appears in the lower display.
- Pressing the on-board computer button again will reset the service shown in the upper display.
- Repeat the procedure for each additional service which is to be reset.

Note: Resetting increases the service counter

Each reset increases the service counter for the operation concerned by 1. The service counter is used in SAM for operation-specific control of additional work.

Note: Sorting is chronological

The order of maintenance measures is chronologically sorted. The most critical item is displayed first.

Note: Vehicle inspection and exhaust-gas test vary from country to country.

The intervals stipulated locally by law are encoded with the BMW diagnosis system.

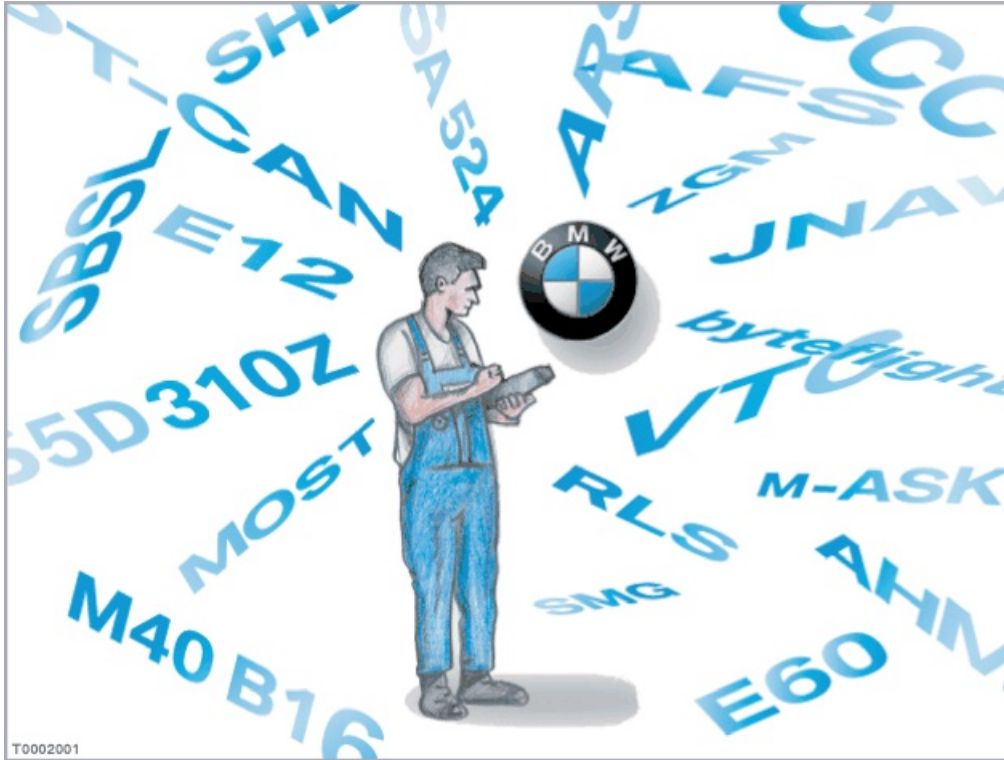


Abbreviations

All models

Introduction

There are a large number of abbreviations used at BMW: in development, production, organisation, sales/marketing, test plans and technical vehicle documentation.



BMW language: about 1,500 abbreviations used in technical areas alone!

To assist with diagnoses, BMW Service Technology has several lists of abbreviations. These abbreviations should not appear cryptic, particularly to those who are coming into the workshop for the first time or from other departments, but also anyone else interested in technology. Abbreviations can be simple keywords, whose meaning is clear. These lists of abbreviations may help to clarify.

Lists of abbreviations

The following lists of abbreviations are available:

- **Series and models with images: Update 01/2013**

Series from recent years with images, sales names, engines etc. [more ...]

- **Engines since 1983: Update 01/2013**

Engines and the related electronic engine control [more ...]

- **Gearbox: Update 01/2013**

Gearboxes and the related electronic transmission control [more ...]

- **Control units: Update 01/2013**

Current control units in diagnosis and programming [more ...]

- **BMW Service Technology - Glossary: Update 07/2007**

More than 700 abbreviations used in BMW Service Technology. New in relation to the 2004 list of abbreviations:

- Some new abbreviations have been included.
- Some abbreviations have been deleted. Reason: Die number of abbreviations should be kept as low as possible, in order to optimise and simplify the reading process.
- Some of the text the "Use" column has been revised.

For technical reasons, the glossary is divided into the following systems:



- Introduction, abbreviations with numerals and characters [more ...]
- - A -
- - B -
- - C -
- - D -
- - E -
- - F -
- - G -
- - H -
- - I -
- - J -
- - K -
- - L -
- - M -
- - N -
- - O -
- - P -
- - Q -
- - R -
- - S -
- - T -
- - U -
- - V -
- - W -
- - X -
- - Z -
- Overview of Unified Parts Group [more ...]

Note: Thanks for your support and feedback.

Our sincere thanks to our colleagues in the diagnosis, programming, and integration departments, to our repair instruction authors and Aftersales Training staff for taking the trouble to draw up their lists, and for their support in aligning the data. Our special thanks to the company archives for providing images of earlier models, and for their extensive and detailed editing work.

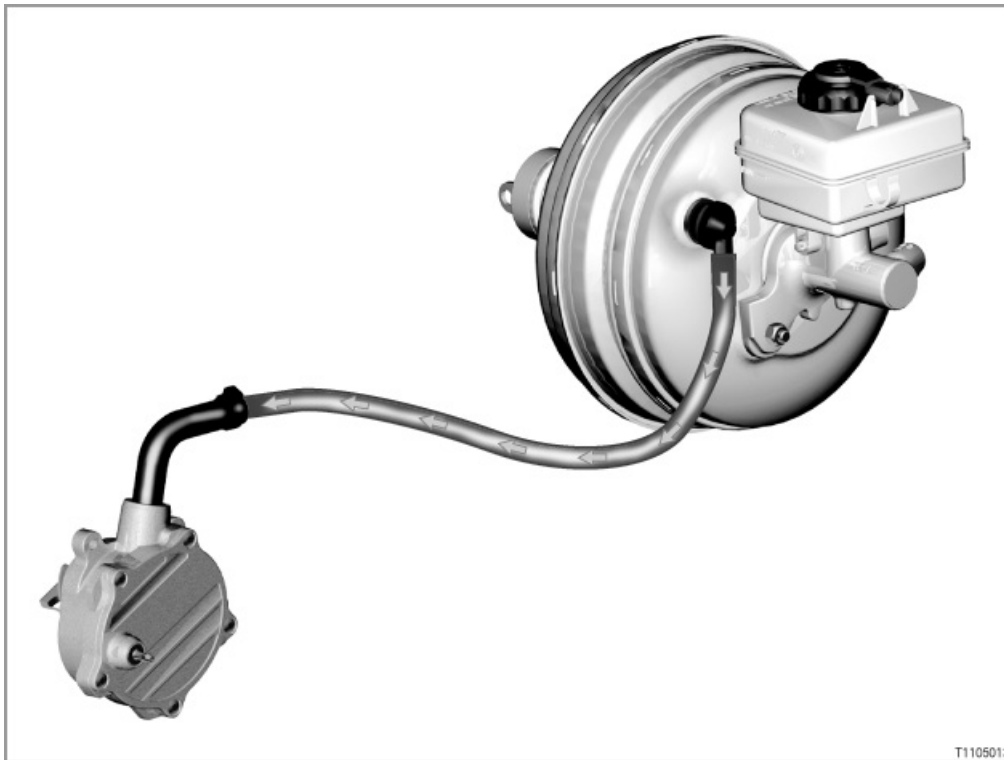
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11 02 05 (130)

Vacuum supply

All models



T1105013

Introduction

Vacuum is principally used for the brake booster.
The vacuum in the inlet pipe depends on the varying engine load.

Diesel engines do not normally have any vacuum in the inlet pipe. Vacuum on diesel engines is provided by a pump that generates the required vacuum.

On spark-ignition engines with Valvetronic, the throttle valve is almost always open when driving. This means that there is a lower low air pressure in the intake manifold.

Spark-ignition engines with low vacuum in the inlet pipe also have a pump that generates additional vacuum.

[System overview ...]

Brief description of components

The following components are involved in the vacuum supply system:

- **Mechanical vacuum pump**

A mechanic vacuum pump is fitted to diesel engines and spark-ignition engines with Valvetronic.

The vacuum pump is mechanically driven by the engine, e.g. via the exhaust camshaft.

- **Suction-jet pump**

As a rule, the suction-jet pump boosts the vacuum in the inlet pipe.

[more ...]

- **Electric vacuum pump**

On some engines, an electric vacuum pump is fitted for additional vacuum supply.

In certain temporary operating situations, the vacuum in the inlet pipe may be too low. In such cases, the inlet pipe vacuum cannot be adequately boosted by the suction-jet pump. In these situations, the electric vacuum pump ensures that sufficient vacuum is available.

Reason: After a cold start, an operating situation occurs in which there is very little inlet pipe vacuum due



to the higher load. The electric vacuum pump is actuated for a certain time. This ensures that the brake is sufficiently boosted when manoeuvring.

After a cold start, the DME will actuate the electric vacuum pump **once only** for max. 60 seconds.

The electric vacuum pump is actuated in the following situations:

- Engine-running signal from DME
- Coolant temperature below 60 °C

The electric vacuum pump is a vane-cell pump.

- **Throttle valve**

The throttle valve changes the cross-sectional area of the inlet pipe. This creates an inlet pipe vacuum behind the throttle valve, especially in overrun mode.

- **DME or DDE: Digital engine electronics or digital diesel electronics**

The DME or DDE actuates the components needed for system functions (e.g. solenoid valves, electric switching valves, electropneumatic pressure converters).

System functions

The system functions of the vacuum system are described using the following examples:

- Power assist for brakes
- Actuation of exhaust flaps
- Adjustment of variable turbine geometry
- Actuation of controlled damping mounts
- Exhaust gas recirculation
- Drawing off of blow-by gases from crankcase
- Blowing out activated charcoal filter

Power assist for brakes

The brake booster amplifies the force exerted at the brake pedal. To do this, the brake booster stores part of the vacuum generated by the engine. The vacuum then amplifies the force generated by pressure on the brake pedal.

Actuation of exhaust flap

A controlled electropneumatic exhaust flap is fitted in the exhaust system. The exhaust flap enhances active sound-damping. The exhaust flap is closed by vacuum.

Adjustment of variable turbine geometry

The variable turbine geometry controls the boost pressure via adjustable guide vanes. The guide vanes are actuated by vacuum.

Actuation of controlled damping mounts

In the basic setting, there is no vacuum at the control component of the mount. The bypass in the mount is closed. Hydraulic fluid flows back and forth through a ring channel between the upper and lower chambers in the mount. The mount acts like a conventional hydraulic bearing. The mount has hard damping.

If a vacuum is applied to the mount's control component, the bypass will open. The hydraulic fluid then flows back and forth between the chambers through a larger cross-sectional area. The mount has softer damping.



Exhaust gas recirculation

With exhaust gas recirculation, part of the exhaust gas is taken from behind the exhaust manifold. This is then fed back into the engine through the intake air duct. The exhaust gas recirculation pipe is located at the inlet to the intake manifold.

If a vacuum is applied to the exhaust gas recirculation valve, the exhaust gas recirculation pipe will open. The level of vacuum is determined by the opening in the exhaust gas recirculation valve.

Exhaust gases flow through a connecting pipe to the exhaust manifold and into the intake manifold.

Drawing off of blow-by gases from crankcase

The crankcase ventilation system uses vacuum to bleed the blow-by gases out of the engine block. Blow-by gases are the small portion of the cylinder fill that passes by the piston rings and into the crankcase during compression. If the blow-by gases are not bled from the engine block through the crankcase ventilation system, they will accumulate in the crankcase. The blow-by gases would then apply pressure on the pistons from below. This would have a negative effect on the downward movement of the pistons in the intake stroke and operating stroke.

Blowing out activated charcoal filter

The fuel tank vent hose is connected to an activated charcoal filter. Vapours from the fuel tank are collected in the activated charcoal filter. The activated charcoal filter is connected to the intake manifold by a pipe. A fuel evaporation control valve is fitted in this pipe. When the fuel evaporation control valve is opened, the vacuum in the manifold draws in fresh air. At the same time, the fresh air blows out the fuel vapours collected in the activated charcoal filter.

Notes for service staff

Service staff should note the following points:

- General information: ---
- Diagnosis: ---
- Encoding/programming: ---
- Car and Key Memory: ---

Subject to change.



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Kinematics diagnosis system and environment

BMW KDS (Beissbarth)

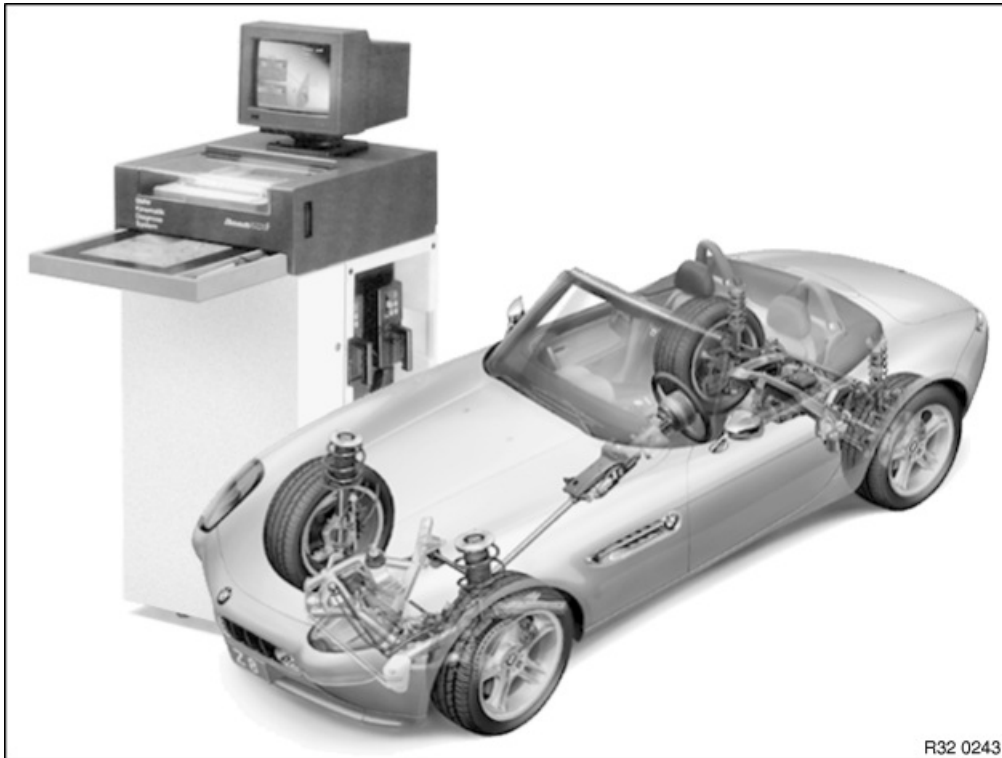


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15.2 Front axle fault

15.3 Rear axle fault

1 Preface

1.1 Objective

The complexity of wheel alignment as a topic has increased. This BMW Service Technology document is therefore intended to achieve several objectives:

- Compiling guidelines for working with the BMW KDS.
- Getting to grips with the technology of wheel alignment on modern vehicles and clarifying any questions that arise.
- Transparency and clarification of different terminology.
- Clarification of fault causes from the past, so that these can be avoided in future after studying this paper.
- Prerequisites for safe dealings with BMW KDS.

1.2 Further development of the BMW kinematics diagnosis system

- The BMW kinematics diagnosis system (KDS) forms an integral element of systems-based philosophy in relation to automotive technology. This provides the peace of mind of being able to work rationally and in a BMW-compliant manner, and the certainty of being prepared for future technological developments. With regard to precision and performance in the area of wheel alignment and chassis adjustment, BMW has done the best it can with what is technologically feasible: The BMW kinematics diagnosis system (KDS).
- The BMW kinematics diagnosis system from Beissbarth is more than just a further development of conventional axle alignment equipment. It sets new dimensions in terms of precision, performance, speed and handling. Guarantees for the perfection upon which BMW customers count in their dealings with BMW Service.
- Ride comfort, driving safety and tyre wear depend to a large extent on perfect interaction with vehicle kinematics. BMW is constantly delivering new generations of chassis and suspension to the market, each of which is superior and/or even closer to perfection than its predecessor. That means that there are fewer kinematic adjustment points on the chassis and suspension and even tighter specified tolerances with regard to wheel alignment and adjustment.
- Through the use of the multilink rear axle and the E36, the previously recommended electronic wheel alignment equipment was no longer suitable for BMW chassis alignment checks. This related to the measuring procedure as well as to the measuring accuracy. The generation of equipment approved with the introduction of the E36 range is still able today to satisfy all the requirements imposed on modern wheel alignment equipment, including the use of the latest computer technology.
- For wheel alignment purposes, only the BMW kinematics diagnosis systems from Beissbarth and Bosch may be used.

1.3 Technical data





- | | | |
|----|-------------------------|---|
| 1. | Display | - 17 inch graphics screen with high-resolution graphics (640x480 pixels with 256 colours) |
| 2. | Teletext | - in each programmed national language |
| 3. | Wheel sizes | - 12"...20" |
| 4. | Vehicle memory capacity | - unlimited |
| 5. | Turntables | - Load-carrying capacity 1000 kg, angle of rotation $\pm 360^\circ$, 450 x 450 x 50mm (L x B x H), sliding range ± 50 mm, weight 18 kg |
| 6. | Sliding supports | - Load-carrying capacity 1000 kg, angle of rotation $\pm 10^\circ$, 450 x 450 x 50mm (L x B x H), sliding range ± 65 mm, weight 17 kg |
| 7. | Electrical connection | - 100...115 V / 220...240 V 50/60 Hz, 0,5 kW (other connections on request) |

1.4 Delivery specification

- 1 PC display element with graphics screen, graphics panel, equipment cabinet, small or large including automatic charging station, DIN-A4 dot matrix printer
- 4 Pickup with CCD camera technology and infrared data transfer, with installed voltage supply
- 1 Wiring harness (comprising 4 cables)
- 1 Brake tensioner
- 1 Steering wheel lock
- 2 Electronic precision turntable supports with integrated sensor and without approach ramp
- 2 Sliding supports without approach ramp



4 BMW quick-release units comprising a locating bell housing P8-68 and quick-release bracket P267 01, incl. coated retaining claws

1 Operating instructions for BMW KDS (8 languages)

1 BMW software and the BMW nominal vehicle data with adjustment images as well as texts for measurement preparations

1.5 Required accessories

2 Locking rods for positioning the vehicle

1 Set of sandbags for specified loading

1.6 Advisable accessories

4 Quick-clamping units

2 Set of collision plates

1 Remote control / display

1 Transport carriage (for ballast pockets, turntables and sliding plates, and 4 quick-release brackets)

2 Measuring options with the BMW KDS

2.1 Front axle

- Toe-in (individual wheel and total toe-in relative to the geometrical driving axis)
- Camber (when driving straight ahead)
- Wheel offset (relative to the left front wheel)
- After-run, steering axis inclination and toe difference angle

2.2 Rear axle

- Toe-in (individual wheel and total toe-in relative to the central plane of the vehicle's longitudinal axis --> previously known as the symmetrical axis)
- Geometrical driving axis
- Camber

2.3 Other measuring options

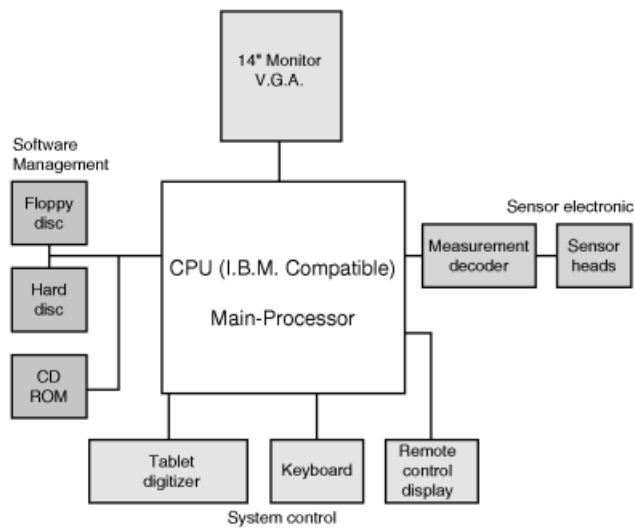
- Wheel offset, rear
- Wheelbase difference
- Lateral offset, right
- Lateral offset, left
- Track width difference
- Axial offset

3. System description

3.1 BMW KDS 1, based on the ML 4000 from Beissbarth



microline 4000 system concept



R32 0248

The KDS 1 is available without surcharge in a choice of two design versions:

1. Mobile workstation



R32 0250

2. Mobile compact cabinet



R32 0249

The larger workstation provides a small storage space for accessories, whereas the compact cabinet is mobile and is ideal for confined working areas. Both versions are available as a wireless measuring system (infrared). In terms of measuring technology, the only difference between these two systems is in their handling and their upgrade options. In both these versions, the four pickups are stored in integrated inserts with battery charge points. Following the automatic charging process, the accumulators on the pickups deliver enough power for 10 hours of continuous operation.

3.2 Computer

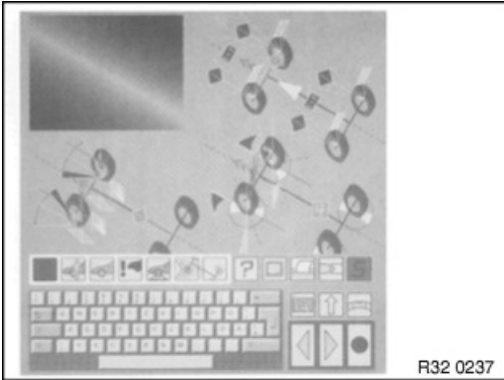
- KDS system 1 comprises tried-and-tested and thoroughly reliable industrial components. The computer is an IBM-compatible 32-bit Intel processor with CD drive, of the kind commonly used in the PC sector.





R32 0235

3.3 Graphics pad



R32 0237

All functions are depicted graphically on a "Symbol" pad. The pad is protected beneath a Plexiglas panel. This is easy to replace whenever major design changes are required. The user interface has no membrane and is therefore safely protected against damage. The main functions are enabled by clicking the symbol with the sensor probe.

3.4 Equipment cabinet



R32 0232

The PC with graphics monitor and pull-out operating pad, mountings for the pickups, the remote control and the DIN-A4 printer are integrated on the workstation. The charging station is located in the cabinet and can also be connected to the pickups and remote control unit by plug-in cables (operation with simultaneous charging of the accumulators / rechargeable batteries).

3.5 Remote display



R32 0231

A wireless remote display unit can be provided on request. The remote control buttons are only enabled during the measurement and setting process (not in response to customer input, choice of vehicle, processing of nominal data etc.). The following displays are supported by the remote display facility:

- Measured value with nominal/actual variance comparison and tolerance bar
- Touchscreen icon for touch-sensitive routines
- Live overview of toe-in / camber values with nominal / actual comparison
- Rims, lateral runout compensation

3.6 Measuring pickup with image sensors (CCD cameras)

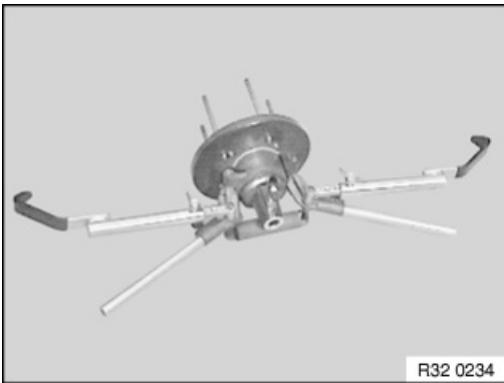




Each of the measuring pickups is equipped with two image sensors and its own processor for wireless infrared transmission with integrated accumulators for automatic measurement. Advantages:

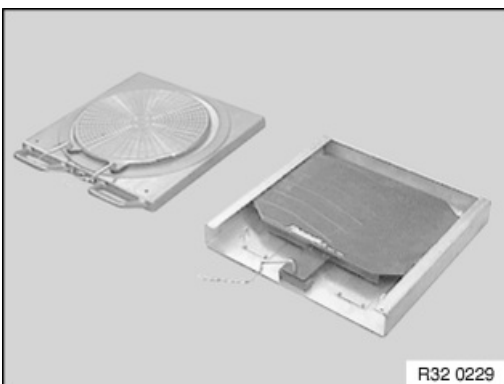
- No temperature deviation
- Very high measuring resolution (theoretically, toe-in could be measured in seconds of an angle).
- Single toe-in range of more than ± 9 degrees relative to constant screen display of toe-in during the replacement of track rod ends
- Exact system precision, i.e. with measurements on the vehicle following rim lateral runout compensation: an accuracy of 2 minutes of angle for toe-in and camber

3.7 BMW quick-release brackets



- BMW quick-release brackets for precise mounting of measuring pickups and measurement without compensation of lateral runout on rims.
- **Note:** Quick-release brackets potentially available, e.g. from older F1600 or ML-3000 models, must not be used with the BMW KDS.

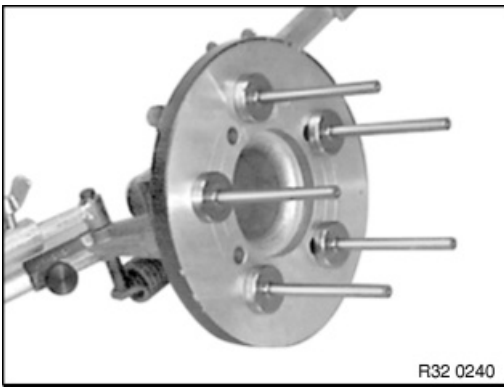
3.8 Rotational / sliding supports



- Electronic precision turntables (rotational supports) for the front wheels with integrated sensor (360 degrees all-round measuring range)
- Robust sliding supports for the rear wheels with a swivelling / rotating upper plate.
- Accessories: Cover for aluminium rotational supports / turntables

3.9 Sensor probes





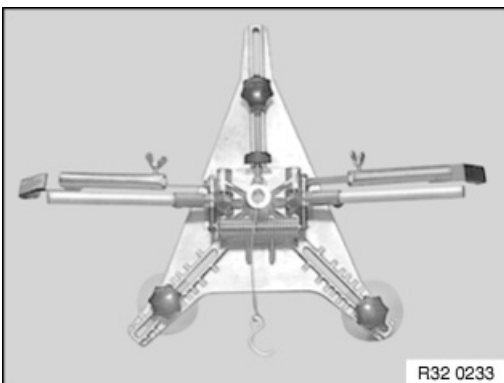
- From April 1993, a new BMW light-alloy wheel (styling No. 18) has been available as a BMW optional accessory. During vehicle alignment checks on these wheels, new sensor probes are required for the quick-release mountings on the recommended wheel alignment equipment.
- On recent deliveries of KDS 1, the new sensor probes are included in the delivery specification (order number: BS 90 19 11).

3.10 Spoiler adapters



- On vehicles with very deep spoilers, it is possible for the measuring beam between the measuring pickups to get interrupted. This is particularly true of the transverse front axle.
- In this case, the spoiler adapter acts as a connecting member between the measuring device holder and the measuring pickup. This causes the measuring pickup to be located 50 mm lower, thereby enabling the measuring beam to pass freely below the spoiler.

3.11 Quick-release mountings



- Quick-release mountings for the wheel alignment of other vehicles with compensation of lateral runout on rims.
- Wheel rims without sensor bore holes (wheel rims for BMW vehicles made by other manufacturers)

3.12 Retaining claws



- The versatile retaining claws and the rubberised retaining claws enable an extremely wide and varied range of clamping variants to be used for the measuring equipment holder, even on exotic, i.e. extremely unusual, light-alloy rims.



R32 0242

4. Workbay

4.1 Environment

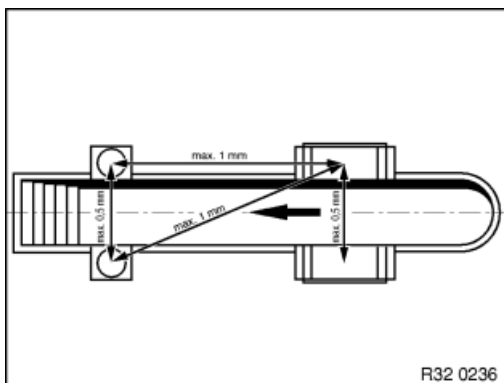
Description:

All the vehicle hoists currently recommended by BMW (cf. Workshop Equipment - Planning Documentation, issue 11) for wheel alignment equipment comply with the requirements for BMW KDS.

Prerequisites:

- Wheel alignment pits
- Telescopic mast vehicle hoists with lowering facility
- 2-stamp vehicle hoists with lowering facility
- Repair statuses with lowering facility
- One measuring station (approx. 4.5 m x 7.0 m).
- The rotational supports ('turntables') must be bolted to the vehicle hoist

The BMW KDS does not impose great demands on its installation location. The device can be used over inspection pits or on vehicle hoists (i.e. workshop ramps).



R32 0236

The locating surfaces for rotational and sliding plates must not exceed the maximum difference in height described below:

- from left to right ± 0.5 mm
- from front to back ± 1.0 mm
- diagonally ± 1.0 mm.

Note:

A height difference between turntables of ± 2 mm from left to right gives rise to a measuring error with camber of $4,8^\circ$.

For comparison: The camber tolerance on the E36 is $\pm 10'$. Tyre tread difference or different inflation pressures give rise to measuring errors on the same magnitude.

4.2 Prerequisites for the wheel alignment check

During the wheel alignment check, the front and rear wheels need to be standing on the rotational and sliding



supports to enable all wheel suspension points during the touch-sensitive routine and the adjusting procedure to remain free of torsional stresses. This demonstrates the need for the rotational and sliding supports for the various wheelbases and track widths on the candidate vehicle for the wheel alignment check to be relocated.

4.3 Measuring tolerance

The full range of measuring tolerance are system tolerances. That means that the total of all individual tolerances yields the value identified in the argumenter. Example - camber: Quick-release bracket + measuring pickup + computer = 1' with a measuring range of $\pm 3^\circ$ (all BMW vehicles lie within this measuring range).

4.4 Measuring station levelling

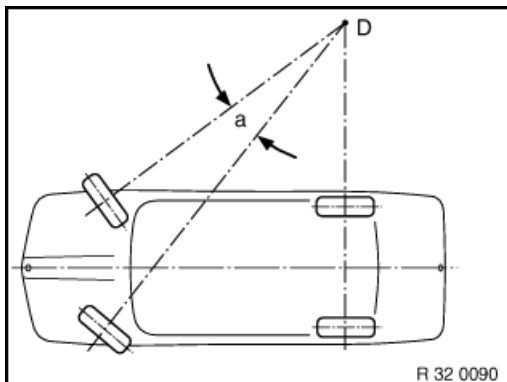
The manufacturers of BMW KDS (Beissbarth / Bosch) are able to check the alignment of the measuring station to the required level of precision, using levelling devices to do so. Bars or hose-type water scales are not suitable. Vehicle hoists must be under load when being levelled to ensure that due account is taken of the uneven deflection in vehicle rails.

Important!

A specialist operator must be involved in the setup work on each vehicle hoist (a member of the manufacturer's Service Product Support staff).

5. Chassis-specific terms

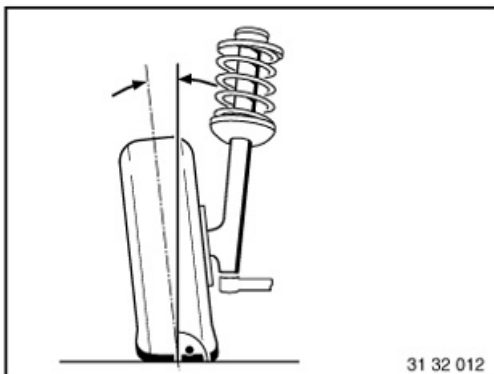
5.1 Toe difference angle



The toe difference angle (a) is the angle setting of the inner cornering wheel relative to the outer cornering wheel when negotiating a bend in the road. Steering is designed in such a way that the relative angular positions of wheels change as steering lock progresses.

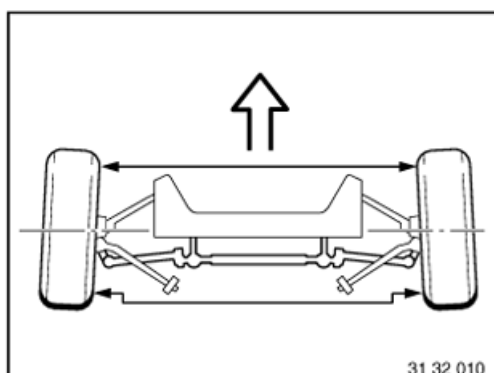
In ideal situations, the wheel axes intersect at Point D in every steering position (except for straight ahead).

5.2 Camber



Camber is the inclination of the wheel from the perpendicular.

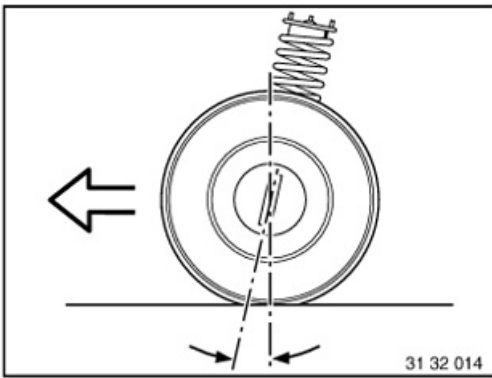
5.3 Toe-in



Toe-in is the reduction in distance of front of front wheels to rear of front wheels. Toe-in prevents the wheels from moving apart when driving (wobbling and scuffing).

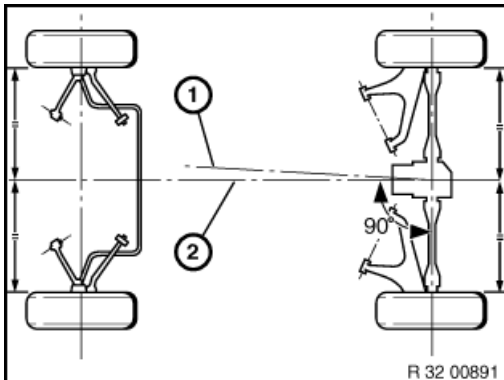
5.4 After-run





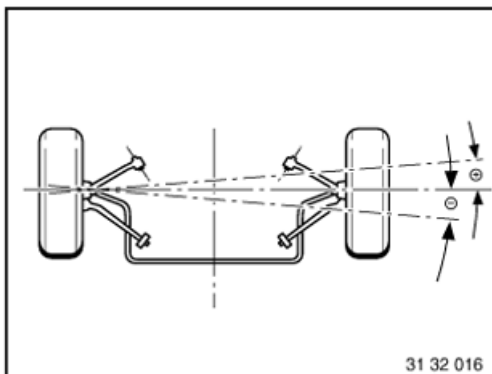
- After-run is the inclination of the kingpin viewed from the side and relative to direction of travel. The line through the centre point of the spring strut support bearing and the control arm ball joint corresponds to the "kingpin".

5.5 Geometrical driving / symmetrical axis



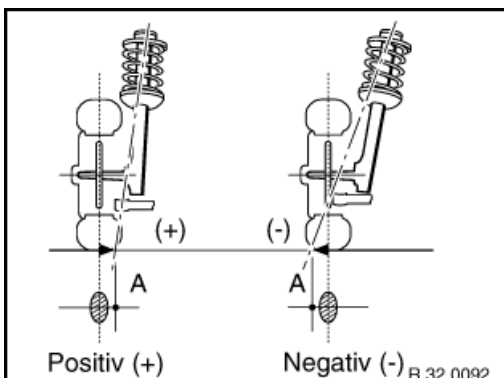
- (1) The geometrical driving axis is the angular intersection point from total toe-in on the rear wheels. Front-wheel measurements are taken in reference to this axis.
- (2) The symmetrical axis constitutes the centreline between front and rear axles.

5.6 Wheel offset angle



- The wheel offset angle is the angular deviation in the intersection line of wheel contact points at a line drawn at 90° to the geometrical driving axis. The wheel offset angle is positive when the right wheel is displaced towards the front and negative when it is displaced towards the rear.

5.7 Kingpin offset / kingpin radius



- The kingpin offset / kingpin radius is the distance from the centre of the wheel contact face to the intersection point of the extension of the kingpin axis.

6. Wheel suspension

Wheel suspension includes the components which connect the wheel to the mostly load-bearing floor pan components on the body which guide the vehicle in the desired direction. This connection involves axles or



comparable construction elements, guided by trailing arms. The type of wheel suspension is one of the determining factors governing the driving characteristics of a vehicle. A distinction is made between two main groups: 1. The rigid axle and 2. The independent suspension.

6.1 Rigid axle

<u>Description</u>	<u>Advantages</u>	<u>Disadvantages</u>
On the rigid axle, both wheels or pairs of wheels are connected by means of a rigid axle body. Every change in a one wheel is transferred to a greater or lesser extent to the other one. If a rigid axle has been installed, it is now only ever as a rear axle. This is sharp contrast to trucks and buses where they are used frequently.	No changes in camber and toe-in occur during suspension action. This means: low tyre wear and good directional stability.	Non-driven rear axles can also receive negative camber and this increases tyre wear.

6.2 Independent suspension

<u>Description</u>	<u>Advantages</u>	<u>Disadvantages</u>
Based on the modern technology standard independent suspension is available on the front and rear axles of BMW vehicles. This development was prompted by inertia mass because a reduction in unsprung masses improves wheel and ground contact, enabling the wheel to maintain better traction. The tracking of independently suspended wheels requires transverse links and trailing arms which can be called upon to absorb occasional high levels of longitudinal and lateral forces.	Independently suspended wheels do not influence one another.	Depending on design, during suspension action, changes can occur in camber, toe-in, track width, after-run and wheelbase.

7. Wheel alignment / test procedure

7.1 Measuring options

The next section itemises all the measuring options and values in an at-a-glance list (FA = front axle, RA = rear axle).

<u>Measuring options</u>	<u>Measuring accuracy</u>	<u>with measuring range</u>	<u>Total measuring range</u>
Total toe-in (FA + RA)	± 2'	± 2°	± 18°
Single wheel toe (FA + RA)	± 2'	± 2°	± 9°
Camber (FA + RA)	± 1'	± 3°	± 10°
Wheel offset (FA)	± 2'	± 2°	± 9°
Geometrical driving axis	± 2'	± 2°	± 9°
Castor	± 4'	± 18°	± 22°
Steering axis inclination	± 4'	± 18°	± 22°
Toe difference angle	± 4'	± 20°	± 20°
Maximum steering angle (FA)	± 4'	± 60°	± 300°
Maximum steering angle (RA)	± 4'	± 9°	± 9°
After-run correction range	± 4'	± 7°	± 10°

Note:

The details for the measuring accuracy only apply when using precision rotational and sliding



supports together with BMW quick release brackets.

7.2 Preparatory work:

Before the measurement can commence, preparatory work is required at the measuring station and on the vehicle (see BMW KDS, operating instructions). This preparatory work includes:

- Ease-of-movement of rotational and sliding plates
- Alignment of rotational and sliding supports to suit track width and wheelbase
- Driving of vehicle centrally onto the supports
- Apply parking brake
- Remove locking pins from the supports to prevent torsional stresses in the chassis and suspension when subjecting the vehicle to load.
- Check the wheel rim and tyre size, tread depth, inflation pressure, steering backlash, wheel bearings and condition of the suspension and shock absorbers
- Secure measuring device bracket to the wheels
- Load vehicle acc. to BMW KDS specification
- Apply sudden load to vehicle with brakes released to obtain a stable centre position.
- Secure the service brake by applying the brake tensioner

7.3 Input / output measurement

This measurement can be conducted as a program-guided measurement check, just like any subsequent adjustment work and the ensuing outgoing alignment check. The sequence of chassis and suspension measuring points to be called up and checked by the systems software. The individual procedural steps cover:

- driving in a straight line to obtain an accurate record of the toe-in and camber value for the rear axle
- touch-sensitive routine to determine after-run, steering axis inclination and toe difference angle
- Recording of toe-in and camber of front axle (prior to this, set the steering centrepont)
- touch-sensitive routine to measure the maximum steering angle on left and right sides
- Checking the measuring value summary with nominal / actual comparison of all measured values.

7.4 Printout of the data

BMW KDS Kleinmotik Diagnose System					
Kunden Nr.			Fahrer Nr.		
Leitzahl			Zachmeisterland		
Kunde			Einschulung		
Aut. Kennz.			Datum 01.12.1994 11:21		
Userwahl					
Fahrbetrieb * BMW * Typ 0 36 * 210 * Serie * 1791gje					
Motor			Motor		
Effizienzwert Leistung 428 mm * 12 mm * 12 mm			Leistung 154 mm * 12 mm * 12 mm		
Kunden-Leistung/Leistung/KP					
Kunden-Profil/Kunden					
links		rechts	links		rechts

		Ein- gangs- wert		Schlepp- wert max. Differenz line		Aus- gangs- wert	
Hinter- achse	Streu	links	-1717	-17301	-17201	-17201	-1718
		rechts	-1718	-17301	-17201	-17201	-1718
		gesamt	-1718		-17301		-17201
	Fahrschwenke		-1717	-17301	-17201	-17201	-1718
Vorder- achse	Nachlauf	links	-1718	-17301	-17201	-17201	-1718
		rechts	-1718	-17301	-17201	-17201	-1718
	Spurdrift- sperrschwenke	links	-1717	-17301	-17201	-17201	-1718
		rechts	-1718	-17301	-17201	-17201	-1718
	Streu	links	-1717	-17301	-17201	-17201	-1718
		rechts	-1718	-17301	-17201	-17201	-1718
	Spur	links	-1717	-17301	-17201	-17201	-1718
		rechts	-1718	-17301	-17201	-17201	-1718
	gesamt		-1718		-17301		-17201
	Radkonvergenz		-1717	-17301	-17201	-17201	-1718
	Maximale Leistung an letztem vorne Rad	links	-1718		-17301		-17201
		rechts	-1718		-17301		-17201

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The report printout from the integrated DIN-A4 printer is subdivided into three areas:

- Headers with customer and vehicle identification data --> here, the customer data entered before the start of measuring work are printed out together with the vehicle data.
- Centre section with vehicle data --> these include brand, type, model and model year of the vehicle, as defined during selection of the nominal data record. Furthermore, this section involves printing out the previously measured values for ride height, inflation pressure and tread depth.



- The final section with all chassis and suspension measuring values comprises 3 columns: incoming wheel alignment check, nominal values and outgoing measurement. The measured values are recorded separately in these 3 columns.

8. Special features

8.1 Wheel alignment with non-selective access

During wheel alignment checks with non-selective access, the selection and sequence of measuring points can be made in any desired order. When doing this, the following points must be observed in order to achieve the correct measuring results:

- Carry out all work as defined during the program-guided wheel alignment check.
- Before the alignment check of toe-in and camber values on the rear axle, the steering must be set in its 'straight-ahead' position to ensure that it is aligned with the vehicle's centre axis.
- Prior to the alignment check of individual toe-in values on the front axle, the steering wheel centre position needs to be determined to ensure that the steering wheel is in its correct position.

8.2 System settings

The following settings only need to be entered and set once: language, display format, date/time, promotional text, remote control with display, selection of rotary plate and printer setting. These remain saved in memory.

9. Comparison, BMW KDS (Bosch - Beissbarth)

	<u>Bosch</u>	<u>Beissbarth</u>
Recording of measuring values	Infrared	Image sensor
Data transmission	Cable	Infrared / cable
Voltage supply to the pickups	Cable	Accumulator / cable
Master key	Infrared	Infrared
Master key with measuring value display	Cable	Infrared
Nominal data memory	Disk	Hard disk
Measuring value memory	Always the last vehicle measured	unlimited vehicle memory capacity
Operating system	---	MS-DOS
Languages	English and one language on order	EN, DE, NI, SV, IT, FR, SP (other languages on request)
Update	3.5" diskette	3.5" diskette from TIS/DIS
Monitor	20"	17"
Computer	---	Pentium
Drives	2 x diskette	1 x diskette, 1 x CD-Rom

10 Change in operation (menu)

10.1 Master key with display

The process of enabling the master key with display is described in the following procedural steps:

1. in the special functions (button "**S**"), call up the "**Service**" menu
2. In the "**Service**" menu, call up the "**Master key**" submenu
3. In the "**Master key**" submenu, select the "**Master key with display**" point - this is a once-only setting.

Important!

On devices without master key, this setting must be set to "**No master key**".

10.2 Summary of operating instructions

1. Switch on the master key by pressing the "**ON**" button (it is permissible to switch this on during the alignment check). The title screen then appears on the LCD.



2. On the measuring equipment cabinet, select "**Straight-ahead driving**" for the "**Incoming alignment check**", then "**Adjusting procedure**" or the "**Outgoing alignment check**". The following graphic appears on the LCD monitor for "**Driving straight ahead**".
3. Pressing the "**Forwards arrow**" calls up the next measuring screen. What next appears on the LCD display blocks are a designation of the measured value and a tolerance bar with measured value. If that measured value is within tolerance, this is depicted with black numerals on a light background. If that measured value lies outside the tolerance, it is then displayed in inverted fashion (i.e. light numerals on a dark background).
4. Pressing the "**F**" button briefly makes it possible to alternate between the designation of the measured value and the nominal value with tolerance within the display block.
5. To scroll onwards through the measured values, press the "**Forward arrow**", "**Backward arrow**" and the "**Cancel**" keys (red spot). The function of this button is identical to that of the buttons/keys on the graphics pad.
6. Even when opting for the "**Alignment check with non-selective access**", the measured values can be chosen in the same way as for the "program-guided alignment check" process.
7. Using the "**Printer**" button enables reports to be printed out during the alignment check. The remote control buttons are only enabled during the measurement and setting process (not in response to customer input, choice of vehicle, etc.).

10.3 Display support

- Measured values with nominal/actual comparison and tolerance bar (nominal values can be displayed by pressing the "**F**" key/button)
- Touchscreen icon for touch-sensitive routines
- Summary of measured values with the latest nominal / actual comparison
- Compensation for lateral runout on wheel rims
- With all other functions (e.g. customer input), the title image appears on the liquid crystal display

Note:

Whenever data transfer from the master key / remote control to the computer is interrupted, the master key icon in the lower right-hand corner of the screen changes colour from green to red and the image on the LCD display is depicted in inverted format, i.e. black becomes white and vice versa. This changeover does not occur in the title image. Once visual connection is re-established, the master key recommences work at the point in the program where the interruption occurred. Continuous visual connection during the alignment check is therefore not necessary.

- The "**Egg timer**" icon on the LCD display indicates: "**Please wait**".
- The "**Battery**" icon in the upper right-hand corner of the LCD display indicates that the battery reserve has been reached.
- Switching off the remote control / master key: Press and hold down the "**F**" key for 5 seconds, then place in the charge bracket or plug in the charging cable. The title image then reappears as the charge indicator light.
- If the master key is placed in the charge bracket during the alignment check process, it must when required be switched on using the "**ON**" key.

11 Updating the software / nominal data

No more diskettes will be sent out to any BMW authorised workshops who in the past subscribed to "**BMW KDS** (Beissbarth / Bosch)". For reasons of cost, it is no longer possible to produce these diskettes in-house on the "**DIS tester**" or on the "**TIS/EPC server**". The data are updated on the TIS-CD on a regular basis

11.1 Prerequisites

- BMW KDS (Beissbarth / Bosch)
- Program status (Beissbarth) TIS-CD: from CD 12/95
- Program status EPC: from 12/95
- Program status (Bosch) TIS-CD: from CD 08/97
- Program status DIS: from V6.0
- Diskettes, 3.5", 1,44 MB (Beissbarth 5 diskettes / Bosch 1 diskette)

11.2 Procedure (Beissbarth)



1. Go into screen mask "**Administration**"
2. Select **KDS button**
3. Select **Beissbarth**
4. After request, load "**diskette 1**" and acknowledge with "**OK**" (program diskette 1 of 2 is created, perform labelling operation)
5. After request, load "**diskette 2**" and acknowledge with "**OK**" (program diskette 2 of 2 is created, perform labelling operation)
6. After request, load "**diskette 3**" and acknowledge with "**OK**" (program diskette 1 of 3 is created, perform labelling operation)
7. After request, load "**diskette 4**" and acknowledge with "**OK**" (program diskette 2 of 3 is created, perform labelling operation)
8. After request, load "**diskette 5**" and acknowledge with "**OK**" (program diskette 3 of 3 is created, perform labelling operation)
9. Perform software update and /or nominal data input on the KDS in the usual manner using the manufactured diskettes.

11.3 Procedure (Bosch)

1. Go into screen mask "**Administration**"
2. Select **KDS button**
3. Select **Bosch**
4. Write a name on "**Diskette 3.1**", when prompted to do so, insert in the drive and confirm by pressing "**OK**" (2x) --> nominal values are then copied to the diskettes
5. Load nominal value diskette 3.1 in drive 3.1, load operating system diskette 3.0 in drive 3.0.
6. Boot device in the usual manner

Important!

When producing KDS diskettes, all data on the diskettes used are overwritten.

Note:

Whenever an error occurs, this is displayed and the program aborts. This process needs to be restarted from the very beginning, which involves deleting all data from the diskette. Possibly use a new diskette.

12. Creating, copying and editing nominal data

12.1 Copying

- Press the "**C**" button and select the vehicle which is to be copied.
- In the special function section, select menu item "**Editing of nominal data**". Set up a new vehicle record in the familiar way. Now the data input screen displays the nominal values for the previously selected vehicle. Re-enter the modified data and save the data record.

12.2 Create

- Press the "**C**" button and, in the special function, select the "**Editing of nominal data**" menu item. Set up a new vehicle record in the familiar way. An empty data input screen now appears. Enter the data and save the data record.

12.3 Edit

- Nominal data programmed in the factory cannot be deleted or changed. If these data are changed, a new vehicle record with those amended nominal data needs to be set up. New vehicle records set up by the user are designated as such in the selection menu with a "+". These vehicles can be deleted by the user by means of the screen button "-" or can be amended using the "<>" button. These buttons only appear on the screen if the vehicles were entered in the system by the user.

13. Special functions

13.1 Customer button for printer protocol

In the "**Special function**" menu, the "**Customer-specific text**" submenu can be called up. An input screen appears on the display. A name and address must be added to this input screen and saved by pressing the "**S**" screen button. The text entered is then imprinted in the header of the protocol / report.

13.2 Alignment options



- in the special functions (button "**S**"), call up the "**Service**" menu
- In the submenu "**alignment**", select the "**Toe-in alignment**" or the "**Toe-in adjustment**" option. The toe-in and camber alignment program guides the user step by step through the alignment process with the help of text and images. At the end of the adjustment process, the deviation in measuring value from every measuring sensor is displayed on the screen.
- These alignment values can be saved in the measuring pickup memory by pressing "**Save**" or the program can be quit by pressing the "**Red button**" without saving (a checking function). The alignment values can be printed out.

13.3 Turntable test

- in the special functions (button "**S**"), call up the "**Service**" menu
- In the "**Service**" menu, call up the "**Turntable test**" function. Rotate left and right-hand turntables and check the display on the screen. Important: The measuring range is ± 306 degrees.

13.4 View and delete customer entries from the database

- In the special functions in the "**Database**" menu, call up the "**Delete**" menu option. The data input screen then appears. Fill in the search boxes with the data to be deleted.
- Using the "-" button, this data record can be deleted. It is now possible to use the touchscreen pen to highlight and delete a new data record.
- The screen buttons "**Arrow up**" and "**Arrow down**" enable users to scroll through the entire database.
- To quit the Delete function, press the Cancel button (red spot).

14. Internal program change

Other internal program changes were made which only slightly alter the program run, but which do optimise the alignment check in terms of comfort and speed. This is described in the following pages:

- Optimisation of compensation for lateral runout on wheel rims in relation to speed.
- Optimisation of impact routines: Marking can still be corrected within the gateway. The message "**Turntables not connected**" no longer causes this routine to terminate. Measuring can continue after the turntables have been plugged back in.
- Standardisation of screen colours with the colours on the panel.
- Extension of texts in some foreign languages.
- Elimination of program and cosmetic errors.
- Electronic water scales
- Discontinuation of wheelbase measurement

15. Faults

15.1 Tyre faults

<u>Error</u>	<u>Impact</u>
1 Tracking, camber, toe difference angle and caster not correct	1 Serious tyre squeak, even at relatively low speeds
2 Too much toe-in or too much positive camber	2 Tyres are worn longitudinally down one outside edge
3 Too much negative camber	3 Tyre wear on inner edge



- | | |
|---|--|
| 4 Worn front axle suspension points on FWD cars | 4 Amplified noise /

Vehicle pulls away one-sidedly when accelerating |
| 5 Incorrect toe adjustment | 5 Radial adjustment of wheel settings /

tyre tread exhibits burr formation within the tread pattern |
| 6 Play in wheel suspension caused by mechanical components (suspension, steering) | 6 Washed out areas /

wobbling on front wheel |
| 7 Insufficient inflation pressure in the tyre | 7 Tyre wear along outer areas |

15.2 Front axle fault

<u>Fault</u>	<u>Cause</u>	<u>Remedy</u>
1. Toe deviation	a) Vehicle not in normal position	a) Correct ride height
	b) Tie rod(s) bent	b) Replace tie rod(s)
	c) Ball joints on track rod(s) misaligned	c) Replace tie rod(s)
	d) Rubber mount in control arm faulty	d) Replace control arms
2. Camber deviation: Camber is defined by design and cannot be adjusted.	a) Rubber mount in control arm faulty	a) Replace control arms
	b) Control arm deformed	b) Replace control arms
	c) Spring strut deformed	c) Replace spring strut
	d) Guide joint worn	d) Replace control arms
	e) Spring deflection too great	e) Replace coil spring, ride height



	f) Front axle carrier deformed	f) Replacing front axle support
	g) Spring strut shock absorber mount misshapen	g) Repair front end
	h) Distortion in floor assembly (engine carrier)	h) Repair body
3. Castor deviation: Caster is defined by design and cannot be adjusted	a) Rubber mount for tension/traction strut defective	a) Replace rubber mount
	b) Tension/traction strut misshapen	b) Replace tension/traction strut,
	c) Control arm deformed	c) Replace control arms
	d) Spring strut deformed	d) Replace spring strut
	e) Wheel house deformed (spring-strut mount)	e) Repair front end
	f) Distortion in floor assembly (engine carrier)	f) Repair body
4. Toe angle difference deviation	Prerequisite: camber and caster are correct	
	a) Tie rods not adjusted uniformly	a) Adjust toe on left and right sides to same value
5. Wheel-offset deviation	Prerequisite: front wheels have equal single toe to geometrical axis	
	a) Front axle carrier deformed	a) Replacing front axle support
	b) Engine carrier deformed	b) Repair body
	c) Control arm deformed	c) Replace control arms



d) Tension/traction strut
misshapen

d) Replace tension/traction strut

15.3 Rear axle defects

<u>Fault</u>	<u>Cause</u>	<u>Remedy</u>
1. Camber deviation	a) Vehicle not in normal position, spring deflection too great	a) Correct ride height
	b) Rubber mount on rear axle carrier unserviceable	b) Replace rubber mount
	c) Rear axle carrier deformed	c) Check rear-axle carrier, replace if necessary
	d) Control arm deformed	d) Check/replace control arm
	e) Traction strut misshapen	e) Check traction strut, replace if necessary
	f) Distortion in floor assembly	f) Repair body
	g) Swinging arm deformed	g) Replace swinging arm
2. Rear-wheel position incorrect	a) Rear axle carrier displaced laterally	a) Check rubber mounts on rear- axle carrier, replace if necessary
	b) Distortion in floor assembly	b) Repair body
3. Toe deviation	a) Vehicle not in normal position, i.e. spring deflection too great	a) Correct ride height
	b) Rubber mounts in rear-axle carrier faulty	b) Replace rubber mount
	c) Control arm deformed	c) Replace control arms
	d) Rubber mount and swinging arm unserviceable	d) Replace swinging arm



e) Rear axle carrier deformed

e) Check rear-axle carrier,
replace if necessary

f) Traction strut misshapen

f) Check traction strut, replace if
necessary

Prerequisite: rear wheel total toe
value must be correct.

4. Deviation from the geometric
axis

a) Distortion in floor assembly

a) Repair body

Other notes on the topic of the "kinematics diagnosis system" can be found in the BMW KDS (Beissbarth / Bosch) operating instructions.

None of the function and system descriptions are covered by an update service. Availability of parts and scope for immediate ordering cannot be derived from this information. The specialist departments shall be in touch with the markets at an appropriate time with further details.



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Kinematics diagnosis system and environment

BMW KDS (Beissbarth)

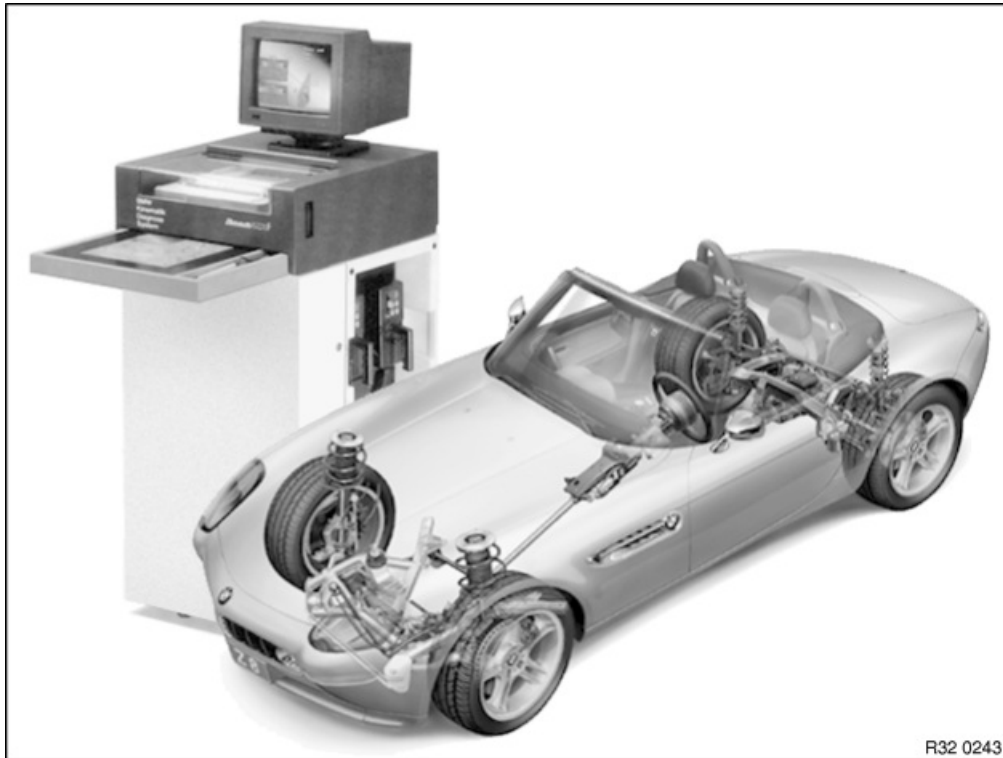


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14. Internal program change

15. Error

15.1 Tyre fault

15.2 Front axle fault

15.3 Rear axle fault

1 Preface

1.1 Objective

The complexity of wheel alignment as a topic has increased. This BMW Service Technology document is therefore intended to achieve several objectives:

- Compiling guidelines for working with the BMW KDS.
- Getting to grips with the technology of wheel alignment on modern vehicles and clarifying any questions that arise.
- Transparency and clarification of different terminology.
- Clarification of fault causes from the past, so that these can be avoided in future after studying this paper.
- Prerequisites for safe dealings with BMW KDS.

1.2 Further development of the BMW kinematics diagnosis system

- The BMW kinematics diagnosis system (KDS) forms an integral element of systems-based philosophy in relation to automotive technology. This provides the peace of mind of being able to work rationally and in a BMW-compliant manner, and the certainty of being prepared for future technological developments. With regard to precision and performance in the area of wheel alignment and chassis adjustment, BMW has done the best it can with what is technologically feasible: The BMW kinematics diagnosis system (KDS).
- The BMW kinematics diagnosis system from Beissbarth is more than just a further development of conventional axle alignment equipment. It sets new dimensions in terms of precision, performance, speed and handling. Guarantees for the perfection upon which BMW customers count in their dealings with BMW Service.
- Ride comfort, driving safety and tyre wear depend to a large extent on perfect interaction with vehicle kinematics. BMW is constantly delivering new generations of chassis and suspension to the market, each of which is superior and/or even closer to perfection than its predecessor. That means that there are fewer kinematic adjustment points on the chassis and suspension and even tighter specified tolerances with regard to wheel alignment and adjustment.
- Through the use of the multilink rear axle and the E36, the previously recommended electronic wheel alignment equipment was no longer suitable for BMW chassis alignment checks. This related to the measuring procedure as well as to the measuring accuracy. The generation of equipment approved with the introduction of the E36 range is still able today to satisfy all the requirements imposed on modern wheel alignment equipment, including the use of the latest computer technology.
- For wheel alignment purposes, only the BMW kinematics diagnosis systems from Beissbarth and Bosch may be used.

1.3 Technical data





- | | | |
|----|-------------------------|---|
| 1. | Display | - 17 inch graphics screen with high-resolution graphics (640x480 pixels with 256 colours) |
| 2. | Teletext | - in each programmed national language |
| 3. | Wheel sizes | - 12"...20" |
| 4. | Vehicle memory capacity | - unlimited |
| 5. | Turntables | - Load-carrying capacity 1000 kg, angle of rotation $\pm 360^\circ$, 450 x 450 x 50mm (L x B x H), sliding range ± 50 mm, weight 18 kg |
| 6. | Sliding supports | - Load-carrying capacity 1000 kg, angle of rotation $\pm 10^\circ$, 450 x 450 x 50mm (L x B x H), sliding range ± 65 mm, weight 17 kg |
| 7. | Electrical connection | - 100...115 V / 220...240 V 50/60 Hz, 0,5 kW (other connections on request) |

1.4 Delivery specification

- 1 PC display element with graphics screen, graphics panel, equipment cabinet, small or large including automatic charging station, DIN-A4 dot matrix printer
- 4 Pickup with CCD camera technology and infrared data transfer, with installed voltage supply
- 1 Wiring harness (comprising 4 cables)
- 1 Brake tensioner
- 1 Steering wheel lock
- 2 Electronic precision turntable supports with integrated sensor and without approach ramp
- 2 Sliding supports without approach ramp



4 BMW quick-release units comprising a locating bell housing P8-68 and quick-release bracket P267 01, incl. coated retaining claws

1 Operating instructions for BMW KDS (8 languages)

1 BMW software and the BMW nominal vehicle data with adjustment images as well as texts for measurement preparations

1.5 Required accessories

2 Locking rods for positioning the vehicle

1 Set of sandbags for specified loading

1.6 Advisable accessories

4 Quick-clamping units

2 Set of collision plates

1 Remote control / display

1 Transport carriage (for ballast pockets, turntables and sliding plates, and 4 quick-release brackets)

2 Measuring options with the BMW KDS

2.1 Front axle

- Toe-in (individual wheel and total toe-in relative to the geometrical driving axis)
- Camber (when driving straight ahead)
- Wheel offset (relative to the left front wheel)
- After-run, steering axis inclination and toe difference angle

2.2 Rear axle

- Toe-in (individual wheel and total toe-in relative to the central plane of the vehicle's longitudinal axis --> previously known as the symmetrical axis)
- Geometrical driving axis
- Camber

2.3 Other measuring options

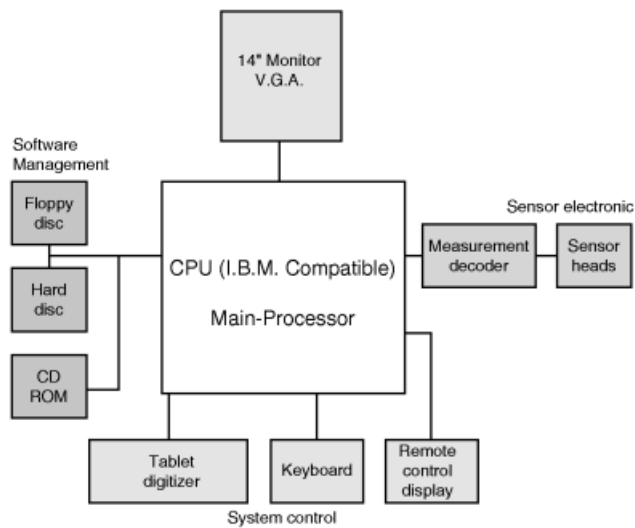
- Wheel offset, rear
- Wheelbase difference
- Lateral offset, right
- Lateral offset, left
- Track width difference
- Axial offset

3. System description

3.1 BMW KDS 1, based on the ML 4000 from Beissbarth



microline 4000 system concept



R32 0248

The KDS 1 is available without surcharge in a choice of two design versions:

1. Mobile workstation



R32 0250

2. Mobile compact cabinet



R32 0249

The larger workstation provides a small storage space for accessories, whereas the compact cabinet is mobile and is ideal for confined working areas. Both versions are available as a wireless measuring system (infrared). In terms of measuring technology, the only difference between these two systems is in their handling and their upgrade options. In both these versions, the four pickups are stored in integrated inserts with battery charge points. Following the automatic charging process, the accumulators on the pickups deliver enough power for 10 hours of continuous operation.

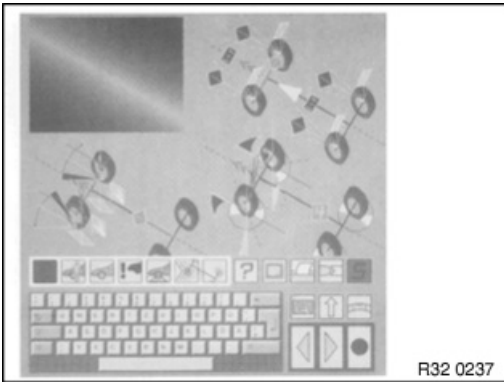
3.2 Computer

- KDS system 1 comprises tried-and-tested and thoroughly reliable industrial components. The computer is an IBM-compatible 32-bit Intel processor with CD drive, of the kind commonly used in the PC sector.



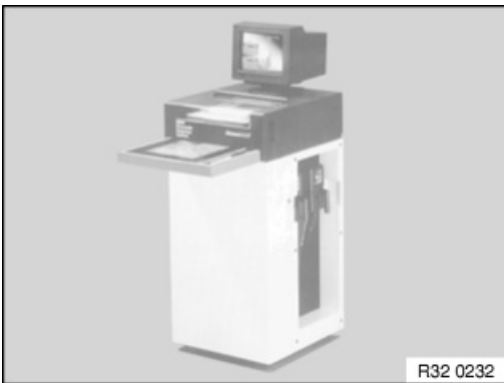


3.3 Graphics pad



All functions are depicted graphically on a "Symbol" pad. The pad is protected beneath a Plexiglas panel. This is easy to replace whenever major design changes are required. The user interface has no membrane and is therefore safely protected against damage. The main functions are enabled by clicking the symbol with the sensor probe.

3.4 Equipment cabinet



The PC with graphics monitor and pull-out operating pad, mountings for the pickups, the remote control and the DIN-A4 printer are integrated on the workstation. The charging station is located in the cabinet and can also be connected to the pickups and remote control unit by plug-in cables (operation with simultaneous charging of the accumulators / rechargeable batteries).

3.5 Remote display



A wireless remote display unit can be provided on request. The remote control buttons are only enabled during the measurement and setting process (not in response to customer input, choice of vehicle, processing of nominal data etc.). The following displays are supported by the remote display facility:

- Measured value with nominal/actual variance comparison and tolerance bar
- Touchscreen icon for touch-sensitive routines
- Live overview of toe-in / camber values with nominal / actual comparison
- Rims, lateral runout compensation

3.6 Measuring pickup with image sensors (CCD cameras)

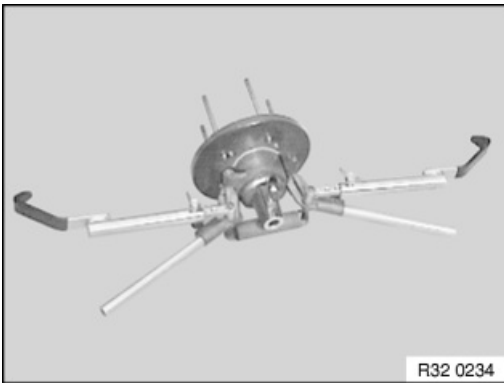




Each of the measuring pickups is equipped with two image sensors and its own processor for wireless infrared transmission with integrated accumulators for automatic measurement. Advantages:

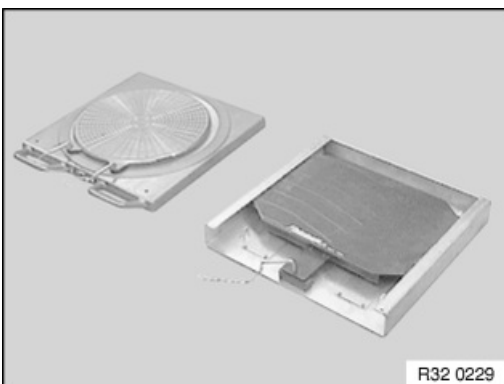
- No temperature deviation
- Very high measuring resolution (theoretically, toe-in could be measured in seconds of an angle).
- Single toe-in range of more than ± 9 degrees relative to constant screen display of toe-in during the replacement of track rod ends
- Exact system precision, i.e. with measurements on the vehicle following rim lateral runout compensation: an accuracy of 2 minutes of angle for toe-in and camber

3.7 BMW quick-release brackets



- BMW quick-release brackets for precise mounting of measuring pickups and measurement without compensation of lateral runout on rims.
- **Note:** Quick-release brackets potentially available, e.g. from older F1600 or ML-3000 models, must not be used with the BMW KDS.

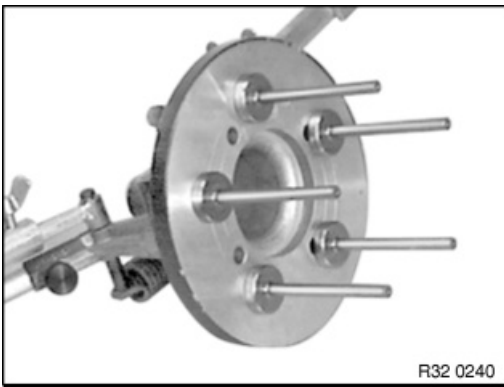
3.8 Rotational / sliding supports



- Electronic precision turntables (rotational supports) for the front wheels with integrated sensor (360 degrees all-round measuring range)
- Robust sliding supports for the rear wheels with a swivelling / rotating upper plate.
- Accessories: Cover for aluminium rotational supports / turntables

3.9 Sensor probes





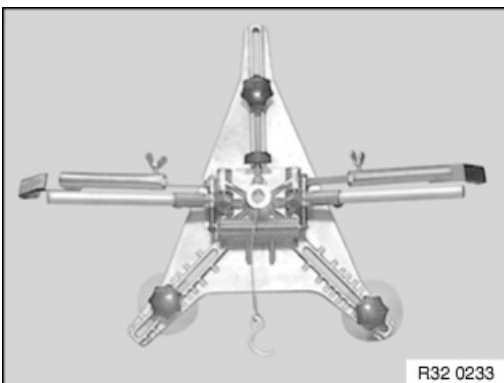
- From April 1993, a new BMW light-alloy wheel (styling No. 18) has been available as a BMW optional accessory. During vehicle alignment checks on these wheels, new sensor probes are required for the quick-release mountings on the recommended wheel alignment equipment.
- On recent deliveries of KDS 1, the new sensor probes are included in the delivery specification (order number: BS 90 19 11).

3.10 Spoiler adapters



- On vehicles with very deep spoilers, it is possible for the measuring beam between the measuring pickups to get interrupted. This is particularly true of the transverse front axle.
- In this case, the spoiler adapter acts as a connecting member between the measuring device holder and the measuring pickup. This causes the measuring pickup to be located 50 mm lower, thereby enabling the measuring beam to pass freely below the spoiler.

3.11 Quick-release mountings



- Quick-release mountings for the wheel alignment of other vehicles with compensation of lateral runout on rims.
- Wheel rims without sensor bore holes (wheel rims for BMW vehicles made by other manufacturers)

3.12 Retaining claws



- The versatile retaining claws and the rubberised retaining claws enable an extremely wide and varied range of clamping variants to be used for the measuring equipment holder, even on exotic, i.e. extremely unusual, light-alloy rims.



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4. Workbay

4.1 Environment

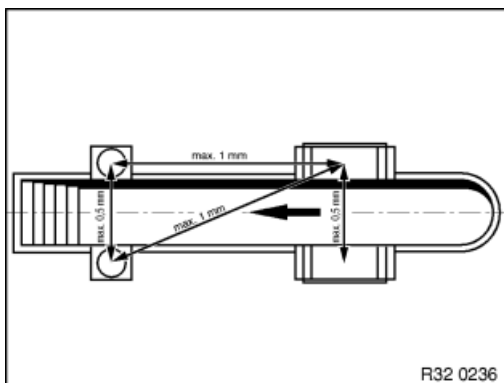
Description:

All the vehicle hoists currently recommended by BMW (cf. Workshop Equipment - Planning Documentation, issue 11) for wheel alignment equipment comply with the requirements for BMW KDS.

Prerequisites:

- Wheel alignment pits
- Telescopic mast vehicle hoists with lowering facility
- 2-stamp vehicle hoists with lowering facility
- Repair statuses with lowering facility
- One measuring station (approx. 4.5 m x 7.0 m).
- The rotational supports ('turntables') must be bolted to the vehicle hoist

The BMW KDS does not impose great demands on its installation location. The device can be used over inspection pits or on vehicle hoists (i.e. workshop ramps).



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The locating surfaces for rotational and sliding plates must not exceed the maximum difference in height described below:

- from left to right ± 0.5 mm
- from front to back ± 1.0 mm
- diagonally ± 1.0 mm.

Note:

A height difference between turntables of ± 2 mm from left to right gives rise to a measuring error with camber of $4,8^\circ$.

For comparison: The camber tolerance on the E36 is $\pm 10'$. Tyre tread difference or different inflation pressures give rise to measuring errors on the same magnitude.

4.2 Prerequisites for the wheel alignment check

During the wheel alignment check, the front and rear wheels need to be standing on the rotational and sliding



supports to enable all wheel suspension points during the touch-sensitive routine and the adjusting procedure to remain free of torsional stresses. This demonstrates the need for the rotational and sliding supports for the various wheelbases and track widths on the candidate vehicle for the wheel alignment check to be relocated.

4.3 Measuring tolerance

The full range of measuring tolerance are system tolerances. That means that the total of all individual tolerances yields the value identified in the argumenter. Example - camber: Quick-release bracket + measuring pickup + computer = 1' with a measuring range of $\pm 3^\circ$ (all BMW vehicles lie within this measuring range).

4.4 Measuring station levelling

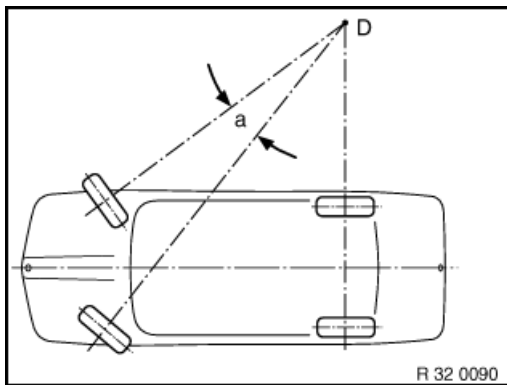
The manufacturers of BMW KDS (Beissbarth / Bosch) are able to check the alignment of the measuring station to the required level of precision, using levelling devices to do so. Bars or hose-type water scales are not suitable. Vehicle hoists must be under load when being levelled to ensure that due account is taken of the uneven deflection in vehicle rails.

Important!

A specialist operator must be involved in the setup work on each vehicle hoist (a member of the manufacturer's Service Product Support staff).

5. Chassis-specific terms

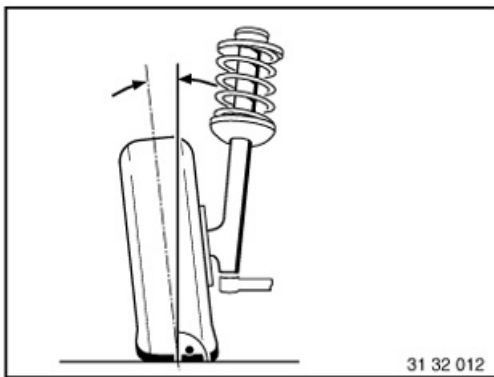
5.1 Toe difference angle



The toe difference angle (a) is the angle setting of the inner cornering wheel relative to the outer cornering wheel when negotiating a bend in the road. Steering is designed in such a way that the relative angular positions of wheels change as steering lock progresses.

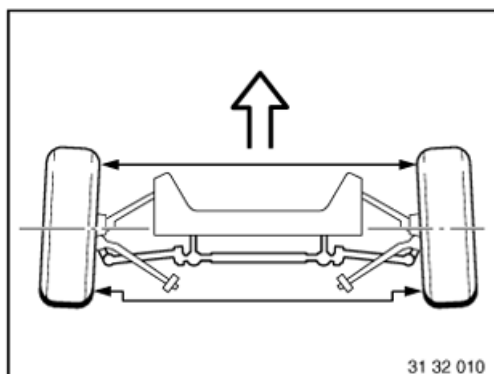
In ideal situations, the wheel axes intersect at Point D in every steering position (except for straight ahead).

5.2 Camber



Camber is the inclination of the wheel from the perpendicular.

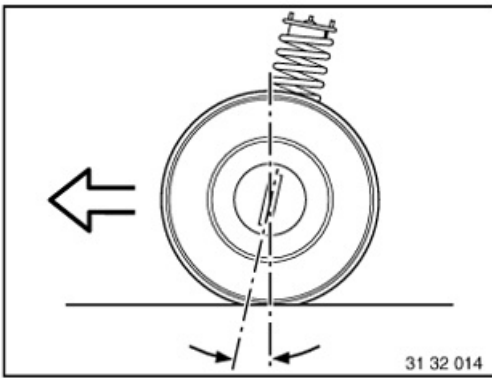
5.3 Toe-in



Toe-in is the reduction in distance of front of front wheels to rear of front wheels. Toe-in prevents the wheels from moving apart when driving (wobbling and scuffing).

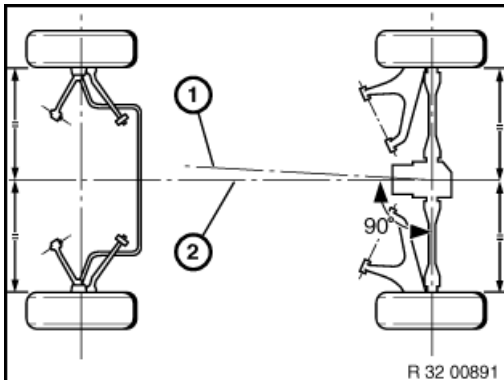
5.4 After-run





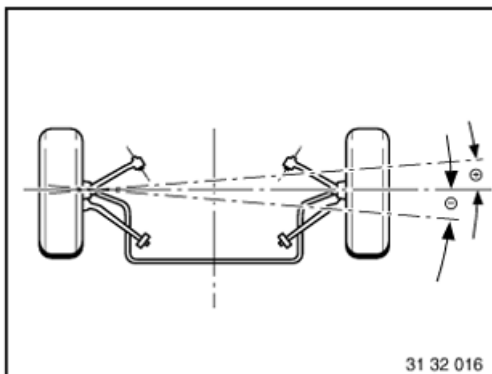
- After-run is the inclination of the kingpin viewed from the side and relative to direction of travel. The line through the centre point of the spring strut support bearing and the control arm ball joint corresponds to the "kingpin".

5.5 Geometrical driving / symmetrical axis



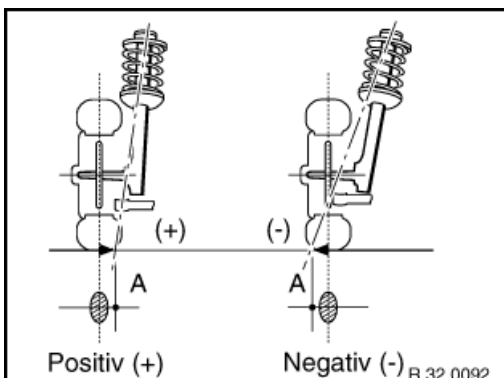
- (1) The geometrical driving axis is the angular intersection point from total toe-in on the rear wheels. Front-wheel measurements are taken in reference to this axis.
- (2) The symmetrical axis constitutes the centreline between front and rear axles.

5.6 Wheel offset angle



- The wheel offset angle is the angular deviation in the intersection line of wheel contact points at a line drawn at 90° to the geometrical driving axis. The wheel offset angle is positive when the right wheel is displaced towards the front and negative when it is displaced towards the rear.

5.7 Kingpin offset / kingpin radius



- The kingpin offset / kingpin radius is the distance from the centre of the wheel contact face to the intersection point of the extension of the kingpin axis.

6. Wheel suspension

Wheel suspension includes the components which connect the wheel to the mostly load-bearing floor pan components on the body which guide the vehicle in the desired direction. This connection involves axles or



comparable construction elements, guided by trailing arms. The type of wheel suspension is one of the determining factors governing the driving characteristics of a vehicle. A distinction is made between two main groups: 1. The rigid axle and 2. The independent suspension.

6.1 Rigid axle

<u>Description</u>	<u>Advantages</u>	<u>Disadvantages</u>
On the rigid axle, both wheels or pairs of wheels are connected by means of a rigid axle body. Every change in a one wheel is transferred to a greater or lesser extent to the other one. If a rigid axle has been installed, it is now only ever as a rear axle. This is sharp contrast to trucks and buses where they are used frequently.	No changes in camber and toe-in occur during suspension action. This means: low tyre wear and good directional stability.	Non-driven rear axles can also receive negative camber and this increases tyre wear.

6.2 Independent suspension

<u>Description</u>	<u>Advantages</u>	<u>Disadvantages</u>
Based on the modern technology standard independent suspension is available on the front and rear axles of BMW vehicles. This development was prompted by inertia mass because a reduction in unsprung masses improves wheel and ground contact, enabling the wheel to maintain better traction. The tracking of independently suspended wheels requires transverse links and trailing arms which can be called upon to absorb occasional high levels of longitudinal and lateral forces.	Independently suspended wheels do not influence one another.	Depending on design, during suspension action, changes can occur in camber, toe-in, track width, after-run and wheelbase.

7. Wheel alignment / test procedure

7.1 Measuring options

The next section itemises all the measuring options and values in an at-a-glance list (FA = front axle, RA = rear axle).

<u>Measuring options</u>	<u>Measuring accuracy</u>	<u>with measuring range</u>	<u>Total measuring range</u>
Total toe-in (FA + RA)	± 2'	± 2°	± 18°
Single wheel toe (FA + RA)	± 2'	± 2°	± 9°
Camber (FA + RA)	± 1'	± 3°	± 10°
Wheel offset (FA)	± 2'	± 2°	± 9°
Geometrical driving axis	± 2'	± 2°	± 9°
Castor	± 4'	± 18°	± 22°
Steering axis inclination	± 4'	± 18°	± 22°
Toe difference angle	± 4'	± 20°	± 20°
Maximum steering angle (FA)	± 4'	± 60°	± 300°
Maximum steering angle (RA)	± 4'	± 9°	± 9°
After-run correction range	± 4'	± 7°	± 10°

Note:

The details for the measuring accuracy only apply when using precision rotational and sliding



supports together with BMW quick release brackets.

7.2 Preparatory work:

Before the measurement can commence, preparatory work is required at the measuring station and on the vehicle (see BMW KDS, operating instructions). This preparatory work includes:

- Ease-of-movement of rotational and sliding plates
- Alignment of rotational and sliding supports to suit track width and wheelbase
- Driving of vehicle centrally onto the supports
- Apply parking brake
- Remove locking pins from the supports to prevent torsional stresses in the chassis and suspension when subjecting the vehicle to load.
- Check the wheel rim and tyre size, tread depth, inflation pressure, steering backlash, wheel bearings and condition of the suspension and shock absorbers
- Secure measuring device bracket to the wheels
- Load vehicle acc. to BMW KDS specification
- Apply sudden load to vehicle with brakes released to obtain a stable centre position.
- Secure the service brake by applying the brake tensioner

7.3 Input / output measurement

This measurement can be conducted as a program-guided measurement check, just like any subsequent adjustment work and the ensuing outgoing alignment check. The sequence of chassis and suspension measuring points to be called up and checked by the systems software. The individual procedural steps cover:

- driving in a straight line to obtain an accurate record of the toe-in and camber value for the rear axle
- touch-sensitive routine to determine after-run, steering axis inclination and toe difference angle
- Recording of toe-in and camber of front axle (prior to this, set the steering centrepont)
- touch-sensitive routine to measure the maximum steering angle on left and right sides
- Checking the measuring value summary with nominal / actual comparison of all measured values.

7.4 Printout of the data

BMW KDS Kleinmotik Diagnose System					
Kunden Nr.			Fahrer Nr.		
Leitzahl			Zachselement		
Kunde			Einschulung		
Aut. Kennz.			Datum 01.12.1994 11:21		
Userwahl					
Fahrbetrieb * BMW * Typ 0 36 * 210 * Serie * 1791gje					
Kilometer			Kilometer		
Leistung			Leistung		
428 mm * 102 mm * 102 mm			104 mm * 102 mm * 102 mm		
Kilometer-Leistung/Kilometer/Kilometer					
Kilometer/Leistung/Kilometer			Kilometer/Leistung/Kilometer		

		Ein- gangs- leistung		Schlepp- max. Differenz line		Aus- gangs- leistung	
Hinter- achse	Innen	links	rechts	1717	1730	1720	1718
		rechts	links	1730	1720	1718	1730
		links	rechts	1720	1718	1730	1720
	gesamt			1718	1718	1718	1718
Vorder- achse	Fahrschwenke			1717	1730	1720	1718
	Nachlauf	links	rechts	1730	1720	1718	1730
		rechts	links	1720	1718	1730	1720
		links	rechts	1718	1718	1718	1718
	Spur	links	rechts	1730	1720	1718	1730
		rechts	links	1720	1718	1730	1720
		links	rechts	1718	1718	1718	1718
	gesamt			1718	1718	1718	1718
	Radsteuer			1717	1730	1720	1718
	Maximale Leistung am letzten rechten Rad	links	rechts	1730	1720	1718	1730
		rechts	links	1720	1718	1730	1720
		links	rechts	1718	1718	1718	1718

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The report printout from the integrated DIN-A4 printer is subdivided into three areas:

- Headers with customer and vehicle identification data --> here, the customer data entered before the start of measuring work are printed out together with the vehicle data.
- Centre section with vehicle data --> these include brand, type, model and model year of the vehicle, as defined during selection of the nominal data record. Furthermore, this section involves printing out the previously measured values for ride height, inflation pressure and tread depth.



- The final section with all chassis and suspension measuring values comprises 3 columns: incoming wheel alignment check, nominal values and outgoing measurement. The measured values are recorded separately in these 3 columns.

8. Special features

8.1 Wheel alignment with non-selective access

During wheel alignment checks with non-selective access, the selection and sequence of measuring points can be made in any desired order. When doing this, the following points must be observed in order to achieve the correct measuring results:

- Carry out all work as defined during the program-guided wheel alignment check.
- Before the alignment check of toe-in and camber values on the rear axle, the steering must be set in its 'straight-ahead' position to ensure that it is aligned with the vehicle's centre axis.
- Prior to the alignment check of individual toe-in values on the front axle, the steering wheel centre position needs to be determined to ensure that the steering wheel is in its correct position.

8.2 System settings

The following settings only need to be entered and set once: language, display format, date/time, promotional text, remote control with display, selection of rotary plate and printer setting. These remain saved in memory.

9. Comparison, BMW KDS (Bosch - Beissbarth)

	<u>Bosch</u>	<u>Beissbarth</u>
Recording of measuring values	Infrared	Image sensor
Data transmission	Cable	Infrared / cable
Voltage supply to the pickups	Cable	Accumulator / cable
Master key	Infrared	Infrared
Master key with measuring value display	Cable	Infrared
Nominal data memory	Disk	Hard disk
Measuring value memory	Always the last vehicle measured	unlimited vehicle memory capacity
Operating system	---	MS-DOS
Languages	English and one language on order	EN, DE, NI, SV, IT, FR, SP (other languages on request)
Update	3.5" diskette	3.5" diskette from TIS/DIS
Monitor	20"	17"
Computer	---	Pentium
Drives	2 x diskette	1 x diskette, 1 x CD-Rom

10 Change in operation (menu)

10.1 Master key with display

The process of enabling the master key with display is described in the following procedural steps:

1. in the special functions (button "**S**"), call up the "**Service**" menu
2. In the "**Service**" menu, call up the "**Master key**" submenu
3. In the "**Master key**" submenu, select the "**Master key with display**" point - this is a once-only setting.

Important!

On devices without master key, this setting must be set to "**No master key**".

10.2 Summary of operating instructions

1. Switch on the master key by pressing the "**ON**" button (it is permissible to switch this on during the alignment check). The title screen then appears on the LCD.



2. On the measuring equipment cabinet, select "**Straight-ahead driving**" for the "**Incoming alignment check**", then "**Adjusting procedure**" or the "**Outgoing alignment check**". The following graphic appears on the LCD monitor for "**Driving straight ahead**".
3. Pressing the "**Forwards arrow**" calls up the next measuring screen. What next appears on the LCD display blocks are a designation of the measured value and a tolerance bar with measured value. If that measured value is within tolerance, this is depicted with black numerals on a light background. If that measured value lies outside the tolerance, it is then displayed in inverted fashion (i.e. light numerals on a dark background).
4. Pressing the "**F**" button briefly makes it possible to alternate between the designation of the measured value and the nominal value with tolerance within the display block.
5. To scroll onwards through the measured values, press the "**Forward arrow**", "**Backward arrow**" and the "**Cancel**" keys (red spot). The function of this button is identical to that of the buttons/keys on the graphics pad.
6. Even when opting for the "**Alignment check with non-selective access**", the measured values can be chosen in the same way as for the "program-guided alignment check" process.
7. Using the "**Printer**" button enables reports to be printed out during the alignment check. The remote control buttons are only enabled during the measurement and setting process (not in response to customer input, choice of vehicle, etc.).

10.3 Display support

- Measured values with nominal/actual comparison and tolerance bar (nominal values can be displayed by pressing the "**F**" key/button)
- Touchscreen icon for touch-sensitive routines
- Summary of measured values with the latest nominal / actual comparison
- Compensation for lateral runout on wheel rims
- With all other functions (e.g. customer input), the title image appears on the liquid crystal display

Note:

Whenever data transfer from the master key / remote control to the computer is interrupted, the master key icon in the lower right-hand corner of the screen changes colour from green to red and the image on the LCD display is depicted in inverted format, i.e. black becomes white and vice versa. This changeover does not occur in the title image. Once visual connection is re-established, the master key recommences work at the point in the program where the interruption occurred. Continuous visual connection during the alignment check is therefore not necessary.

- The "**Egg timer**" icon on the LCD display indicates: "**Please wait**".
- The "**Battery**" icon in the upper right-hand corner of the LCD display indicates that the battery reserve has been reached.
- Switching off the remote control / master key: Press and hold down the "**F**" key for 5 seconds, then place in the charge bracket or plug in the charging cable. The title image then reappears as the charge indicator light.
- If the master key is placed in the charge bracket during the alignment check process, it must when required be switched on using the "**ON**" key.

11 Updating the software / nominal data

No more diskettes will be sent out to any BMW authorised workshops who in the past subscribed to "**BMW KDS** (Beissbarth / Bosch)". For reasons of cost, it is no longer possible to produce these diskettes in-house on the "**DIS tester**" or on the "**TIS/EPC server**". The data are updated on the TIS-CD on a regular basis

11.1 Prerequisites

- BMW KDS (Beissbarth / Bosch)
- Program status (Beissbarth) TIS-CD: from CD 12/95
- Program status EPC: from 12/95
- Program status (Bosch) TIS-CD: from CD 08/97
- Program status DIS: from V6.0
- Diskettes, 3.5", 1,44 MB (Beissbarth 5 diskettes / Bosch 1 diskette)

11.2 Procedure (Beissbarth)



1. Go into screen mask "**Administration**"
2. Select **KDS button**
3. Select **Beissbarth**
4. After request, load "**diskette 1**" and acknowledge with "**OK**" (program diskette 1 of 2 is created, perform labelling operation)
5. After request, load "**diskette 2**" and acknowledge with "**OK**" (program diskette 2 of 2 is created, perform labelling operation)
6. After request, load "**diskette 3**" and acknowledge with "**OK**" (program diskette 1 of 3 is created, perform labelling operation)
7. After request, load "**diskette 4**" and acknowledge with "**OK**" (program diskette 2 of 3 is created, perform labelling operation)
8. After request, load "**diskette 5**" and acknowledge with "**OK**" (program diskette 3 of 3 is created, perform labelling operation)
9. Perform software update and /or nominal data input on the KDS in the usual manner using the manufactured diskettes.

11.3 Procedure (Bosch)

1. Go into screen mask "**Administration**"
2. Select **KDS button**
3. Select **Bosch**
4. Write a name on "**Diskette 3.1**", when prompted to do so, insert in the drive and confirm by pressing "**OK**" (2x) --> nominal values are then copied to the diskettes
5. Load nominal value diskette 3.1 in drive 3.1, load operating system diskette 3.0 in drive 3.0.
6. Boot device in the usual manner

Important!

When producing KDS diskettes, all data on the diskettes used are overwritten.

Note:

Whenever an error occurs, this is displayed and the program aborts. This process needs to be restarted from the very beginning, which involves deleting all data from the diskette. Possibly use a new diskette.

12. Creating, copying and editing nominal data

12.1 Copying

- Press the "**C**" button and select the vehicle which is to be copied.
- In the special function section, select menu item "**Editing of nominal data**". Set up a new vehicle record in the familiar way. Now the data input screen displays the nominal values for the previously selected vehicle. Re-enter the modified data and save the data record.

12.2 Create

- Press the "**C**" button and, in the special function, select the "**Editing of nominal data**" menu item. Set up a new vehicle record in the familiar way. An empty data input screen now appears. Enter the data and save the data record.

12.3 Edit

- Nominal data programmed in the factory cannot be deleted or changed. If these data are changed, a new vehicle record with those amended nominal data needs to be set up. New vehicle records set up by the user are designated as such in the selection menu with a "+". These vehicles can be deleted by the user by means of the screen button "-" or can be amended using the "<>" button. These buttons only appear on the screen if the vehicles were entered in the system by the user.

13. Special functions

13.1 Customer button for printer protocol

In the "**Special function**" menu, the "**Customer-specific text**" submenu can be called up. An input screen appears on the display. A name and address must be added to this input screen and saved by pressing the "**S**" screen button. The text entered is then imprinted in the header of the protocol / report.

13.2 Alignment options



- in the special functions (button "**S**"), call up the "**Service**" menu
- In the submenu "**alignment**", select the "**Toe-in alignment**" or the "**Toe-in adjustment**" option. The toe-in and camber alignment program guides the user step by step through the alignment process with the help of text and images. At the end of the adjustment process, the deviation in measuring value from every measuring sensor is displayed on the screen.
- These alignment values can be saved in the measuring pickup memory by pressing "**Save**" or the program can be quit by pressing the "**Red button**" without saving (a checking function). The alignment values can be printed out.

13.3 Turntable test

- in the special functions (button "**S**"), call up the "**Service**" menu
- In the "**Service**" menu, call up the "**Turntable test**" function. Rotate left and right-hand turntables and check the display on the screen. Important: The measuring range is ± 306 degrees.

13.4 View and delete customer entries from the database

- In the special functions in the "**Database**" menu, call up the "**Delete**" menu option. The data input screen then appears. Fill in the search boxes with the data to be deleted.
- Using the "-" button, this data record can be deleted. It is now possible to use the touchscreen pen to highlight and delete a new data record.
- The screen buttons "**Arrow up**" and "**Arrow down**" enable users to scroll through the entire database.
- To quit the Delete function, press the Cancel button (red spot).

14. Internal program change

Other internal program changes were made which only slightly alter the program run, but which do optimise the alignment check in terms of comfort and speed. This is described in the following pages:

- Optimisation of compensation for lateral runout on wheel rims in relation to speed.
- Optimisation of impact routines: Marking can still be corrected within the gateway. The message "**Turntables not connected**" no longer causes this routine to terminate. Measuring can continue after the turntables have been plugged back in.
- Standardisation of screen colours with the colours on the panel.
- Extension of texts in some foreign languages.
- Elimination of program and cosmetic errors.
- Electronic water scales
- Discontinuation of wheelbase measurement

15. Faults

15.1 Tyre faults

<u>Error</u>	<u>Impact</u>
1 Tracking, camber, toe difference angle and caster not correct	1 Serious tyre squeak, even at relatively low speeds
2 Too much toe-in or too much positive camber	2 Tyres are worn longitudinally down one outside edge
3 Too much negative camber	3 Tyre wear on inner edge



- | | |
|---|--|
| 4 Worn front axle suspension points on FWD cars | 4 Amplified noise /

Vehicle pulls away one-sidedly when accelerating |
| 5 Incorrect toe adjustment | 5 Radial adjustment of wheel settings /

tyre tread exhibits burr formation within the tread pattern |
| 6 Play in wheel suspension caused by mechanical components (suspension, steering) | 6 Washed out areas /

wobbling on front wheel |
| 7 Insufficient inflation pressure in the tyre | 7 Tyre wear along outer areas |

15.2 Front axle fault

<u>Fault</u>	<u>Cause</u>	<u>Remedy</u>
1. Toe deviation	a) Vehicle not in normal position	a) Correct ride height
	b) Tie rod(s) bent	b) Replace tie rod(s)
	c) Ball joints on track rod(s) misaligned	c) Replace tie rod(s)
	d) Rubber mount in control arm faulty	d) Replace control arms
2. Camber deviation: Camber is defined by design and cannot be adjusted.	a) Rubber mount in control arm faulty	a) Replace control arms
	b) Control arm deformed	b) Replace control arms
	c) Spring strut deformed	c) Replace spring strut
	d) Guide joint worn	d) Replace control arms
	e) Spring deflection too great	e) Replace coil spring, ride height



	f) Front axle carrier deformed	f) Replacing front axle support
	g) Spring strut shock absorber mount misshapen	g) Repair front end
	h) Distortion in floor assembly (engine carrier)	h) Repair body
3. Castor deviation: Caster is defined by design and cannot be adjusted	a) Rubber mount for tension/traction strut defective	a) Replace rubber mount
	b) Tension/traction strut misshapen	b) Replace tension/traction strut,
	c) Control arm deformed	c) Replace control arms
	d) Spring strut deformed	d) Replace spring strut
	e) Wheel house deformed (spring-strut mount)	e) Repair front end
	f) Distortion in floor assembly (engine carrier)	f) Repair body
4. Toe angle difference deviation	Prerequisite: camber and caster are correct	
	a) Tie rods not adjusted uniformly	a) Adjust toe on left and right sides to same value
5. Wheel-offset deviation	Prerequisite: front wheels have equal single toe to geometrical axis	
	a) Front axle carrier deformed	a) Replacing front axle support
	b) Engine carrier deformed	b) Repair body
	c) Control arm deformed	c) Replace control arms



d) Tension/traction strut
misshapen

d) Replace tension/traction strut

15.3 Rear axle defects

<u>Fault</u>	<u>Cause</u>	<u>Remedy</u>
1. Camber deviation	a) Vehicle not in normal position, spring deflection too great	a) Correct ride height
	b) Rubber mount on rear axle carrier unserviceable	b) Replace rubber mount
	c) Rear axle carrier deformed	c) Check rear-axle carrier, replace if necessary
	d) Control arm deformed	d) Check/replace control arm
	e) Traction strut misshapen	e) Check traction strut, replace if necessary
	f) Distortion in floor assembly	f) Repair body
	g) Swinging arm deformed	g) Replace swinging arm
2. Rear-wheel position incorrect	a) Rear axle carrier displaced laterally	a) Check rubber mounts on rear- axle carrier, replace if necessary
	b) Distortion in floor assembly	b) Repair body
3. Toe deviation	a) Vehicle not in normal position, i.e. spring deflection too great	a) Correct ride height
	b) Rubber mounts in rear-axle carrier faulty	b) Replace rubber mount
	c) Control arm deformed	c) Replace control arms
	d) Rubber mount and swinging arm unserviceable	d) Replace swinging arm



e) Rear axle carrier deformed

e) Check rear-axle carrier,
replace if necessary

f) Traction strut misshapen

f) Check traction strut, replace if
necessary

Prerequisite: rear wheel total toe
value must be correct.

4. Deviation from the geometric
axis

a) Distortion in floor assembly

a) Repair body

Other notes on the topic of the "kinematics diagnosis system" can be found in the BMW KDS (Beissbarth / Bosch) operating instructions.

None of the function and system descriptions are covered by an update service. Availability of parts and scope for immediate ordering cannot be derived from this information. The specialist departments shall be in touch with the markets at an appropriate time with further details.



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Kinematics diagnosis system and environment

BMW KDS (Beissbarth)

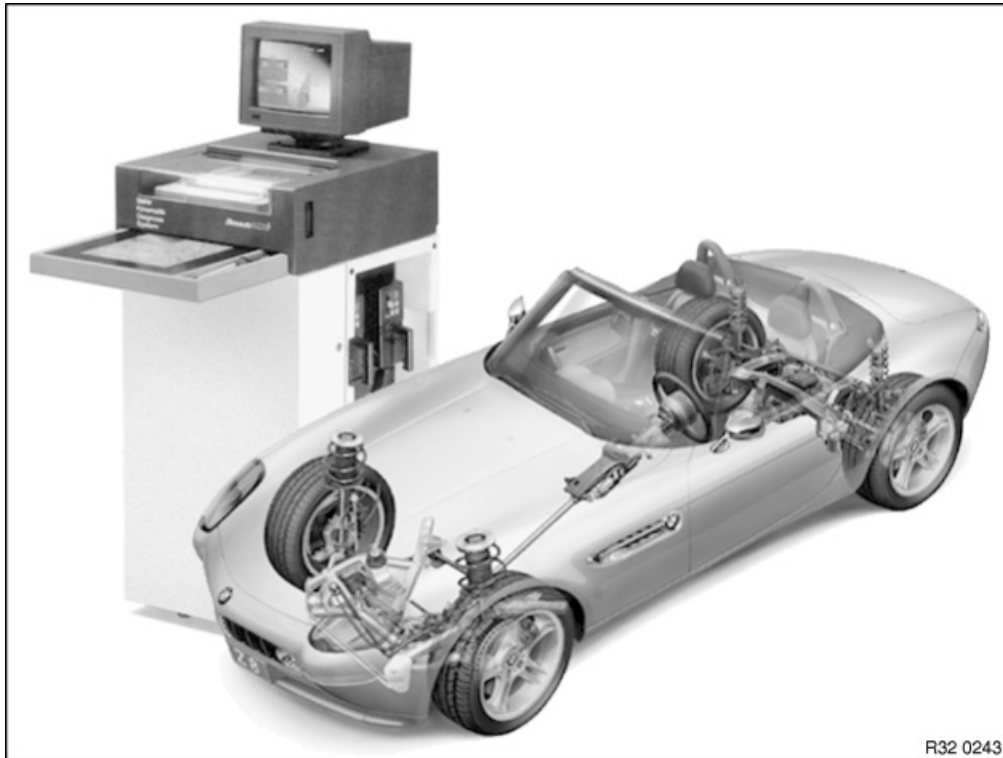


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14. Internal program change

15. Error

15.1 Tyre fault

15.2 Front axle fault

15.3 Rear axle fault

1 Preface

1.1 Objective

The complexity of wheel alignment as a topic has increased. This BMW Service Technology document is therefore intended to achieve several objectives:

- Compiling guidelines for working with the BMW KDS.
- Getting to grips with the technology of wheel alignment on modern vehicles and clarifying any questions that arise.
- Transparency and clarification of different terminology.
- Clarification of fault causes from the past, so that these can be avoided in future after studying this paper.
- Prerequisites for safe dealings with BMW KDS.

1.2 Further development of the BMW kinematics diagnosis system

- The BMW kinematics diagnosis system (KDS) forms an integral element of systems-based philosophy in relation to automotive technology. This provides the peace of mind of being able to work rationally and in a BMW-compliant manner, and the certainty of being prepared for future technological developments. With regard to precision and performance in the area of wheel alignment and chassis adjustment, BMW has done the best it can with what is technologically feasible: The BMW kinematics diagnosis system (KDS).
- The BMW kinematics diagnosis system from Beissbarth is more than just a further development of conventional axle alignment equipment. It sets new dimensions in terms of precision, performance, speed and handling. Guarantees for the perfection upon which BMW customers count in their dealings with BMW Service.
- Ride comfort, driving safety and tyre wear depend to a large extent on perfect interaction with vehicle kinematics. BMW is constantly delivering new generations of chassis and suspension to the market, each of which is superior and/or even closer to perfection than its predecessor. That means that there are fewer kinematic adjustment points on the chassis and suspension and even tighter specified tolerances with regard to wheel alignment and adjustment.
- Through the use of the multilink rear axle and the E36, the previously recommended electronic wheel alignment equipment was no longer suitable for BMW chassis alignment checks. This related to the measuring procedure as well as to the measuring accuracy. The generation of equipment approved with the introduction of the E36 range is still able today to satisfy all the requirements imposed on modern wheel alignment equipment, including the use of the latest computer technology.
- For wheel alignment purposes, only the BMW kinematics diagnosis systems from Beissbarth and Bosch may be used.

1.3 Technical data





- | | | |
|----|-------------------------|---|
| 1. | Display | - 17 inch graphics screen with high-resolution graphics (640x480 pixels with 256 colours) |
| 2. | Teletext | - in each programmed national language |
| 3. | Wheel sizes | - 12"...20" |
| 4. | Vehicle memory capacity | - unlimited |
| 5. | Turntables | - Load-carrying capacity 1000 kg, angle of rotation $\pm 360^\circ$, 450 x 450 x 50mm (L x B x H), sliding range ± 50 mm, weight 18 kg |
| 6. | Sliding supports | - Load-carrying capacity 1000 kg, angle of rotation $\pm 10^\circ$, 450 x 450 x 50mm (L x B x H), sliding range ± 65 mm, weight 17 kg |
| 7. | Electrical connection | - 100...115 V / 220...240 V 50/60 Hz, 0,5 kW (other connections on request) |

1.4 Delivery specification

- 1 PC display element with graphics screen, graphics panel, equipment cabinet, small or large including automatic charging station, DIN-A4 dot matrix printer
- 4 Pickup with CCD camera technology and infrared data transfer, with installed voltage supply
- 1 Wiring harness (comprising 4 cables)
- 1 Brake tensioner
- 1 Steering wheel lock
- 2 Electronic precision turntable supports with integrated sensor and without approach ramp
- 2 Sliding supports without approach ramp



4 BMW quick-release units comprising a locating bell housing P8-68 and quick-release bracket P267 01, incl. coated retaining claws

1 Operating instructions for BMW KDS (8 languages)

1 BMW software and the BMW nominal vehicle data with adjustment images as well as texts for measurement preparations

1.5 Required accessories

2 Locking rods for positioning the vehicle

1 Set of sandbags for specified loading

1.6 Advisable accessories

4 Quick-clamping units

2 Set of collision plates

1 Remote control / display

1 Transport carriage (for ballast pockets, turntables and sliding plates, and 4 quick-release brackets)

2 Measuring options with the BMW KDS

2.1 Front axle

- Toe-in (individual wheel and total toe-in relative to the geometrical driving axis)
- Camber (when driving straight ahead)
- Wheel offset (relative to the left front wheel)
- After-run, steering axis inclination and toe difference angle

2.2 Rear axle

- Toe-in (individual wheel and total toe-in relative to the central plane of the vehicle's longitudinal axis --> previously known as the symmetrical axis)
- Geometrical driving axis
- Camber

2.3 Other measuring options

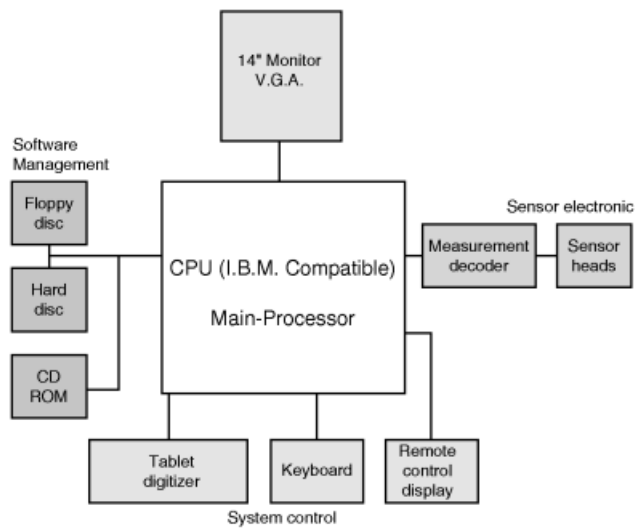
- Wheel offset, rear
- Wheelbase difference
- Lateral offset, right
- Lateral offset, left
- Track width difference
- Axial offset

3. System description

3.1 BMW KDS 1, based on the ML 4000 from Beissbarth



microline 4000 system concept



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The KDS 1 is available without surcharge in a choice of two design versions:

1. Mobile workstation



R32 0250

2. Mobile compact cabinet



R32 0249

The larger workstation provides a small storage space for accessories, whereas the compact cabinet is mobile and is ideal for confined working areas. Both versions are available as a wireless measuring system (infrared). In terms of measuring technology, the only difference between these two systems is in their handling and their upgrade options. In both these versions, the four pickups are stored in integrated inserts with battery charge points. Following the automatic charging process, the accumulators on the pickups deliver enough power for 10 hours of continuous operation.

3.2 Computer

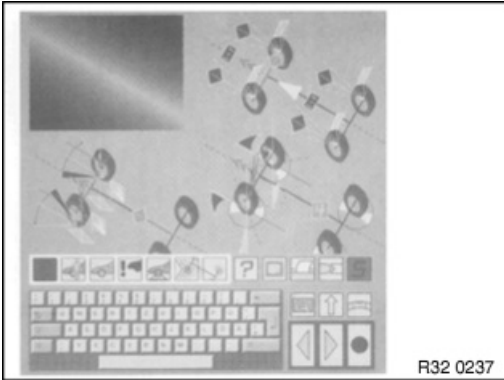
- KDS system 1 comprises tried-and-tested and thoroughly reliable industrial components. The computer is an IBM-compatible 32-bit Intel processor with CD drive, of the kind commonly used in the PC sector.





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3.3 Graphics pad



R32 0237

All functions are depicted graphically on a "Symbol" pad. The pad is protected beneath a Plexiglas panel. This is easy to replace whenever major design changes are required. The user interface has no membrane and is therefore safely protected against damage. The main functions are enabled by clicking the symbol with the sensor probe.

3.4 Equipment cabinet



R32 0232

The PC with graphics monitor and pull-out operating pad, mountings for the pickups, the remote control and the DIN-A4 printer are integrated on the workstation. The charging station is located in the cabinet and can also be connected to the pickups and remote control unit by plug-in cables (operation with simultaneous charging of the accumulators / rechargeable batteries).

3.5 Remote display



R32 0231

A wireless remote display unit can be provided on request. The remote control buttons are only enabled during the measurement and setting process (not in response to customer input, choice of vehicle, processing of nominal data etc.). The following displays are supported by the remote display facility:

- Measured value with nominal/actual variance comparison and tolerance bar
- Touchscreen icon for touch-sensitive routines
- Live overview of toe-in / camber values with nominal / actual comparison
- Rims, lateral runout compensation

3.6 Measuring pickup with image sensors (CCD cameras)

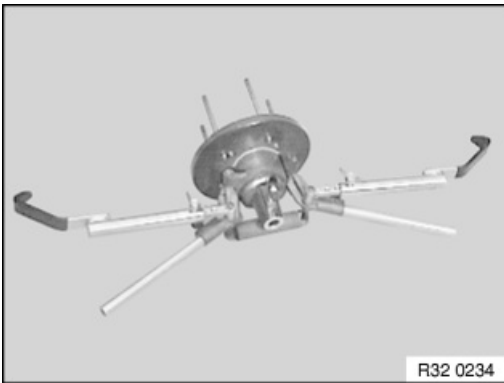




Each of the measuring pickups is equipped with two image sensors and its own processor for wireless infrared transmission with integrated accumulators for automatic measurement. Advantages:

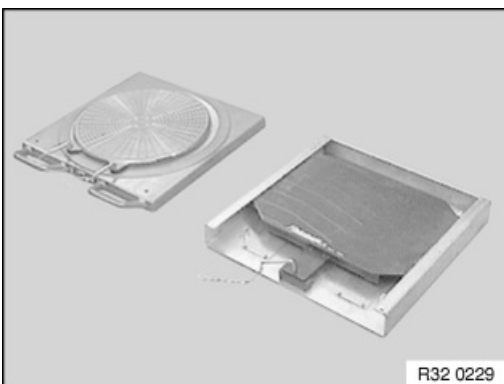
- No temperature deviation
- Very high measuring resolution (theoretically, toe-in could be measured in seconds of an angle).
- Single toe-in range of more than ± 9 degrees relative to constant screen display of toe-in during the replacement of track rod ends
- Exact system precision, i.e. with measurements on the vehicle following rim lateral runout compensation: an accuracy of 2 minutes of angle for toe-in and camber

3.7 BMW quick-release brackets



- BMW quick-release brackets for precise mounting of measuring pickups and measurement without compensation of lateral runout on rims.
- **Note:** Quick-release brackets potentially available, e.g. from older F1600 or ML-3000 models, must not be used with the BMW KDS.

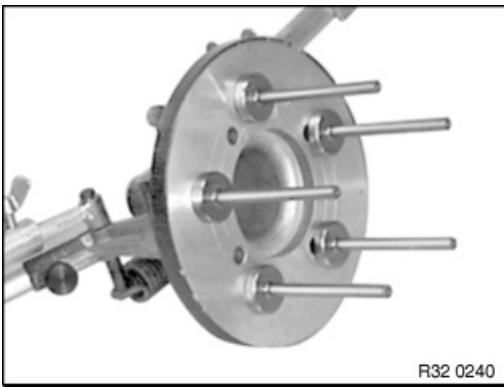
3.8 Rotational / sliding supports



- Electronic precision turntables (rotational supports) for the front wheels with integrated sensor (360 degrees all-round measuring range)
- Robust sliding supports for the rear wheels with a swivelling / rotating upper plate.
- Accessories: Cover for aluminium rotational supports / turntables

3.9 Sensor probes





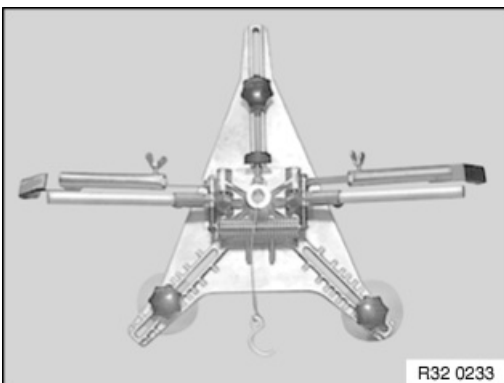
- From April 1993, a new BMW light-alloy wheel (styling No. 18) has been available as a BMW optional accessory. During vehicle alignment checks on these wheels, new sensor probes are required for the quick-release mountings on the recommended wheel alignment equipment.
- On recent deliveries of KDS 1, the new sensor probes are included in the delivery specification (order number: BS 90 19 11).

3.10 Spoiler adapters



- On vehicles with very deep spoilers, it is possible for the measuring beam between the measuring pickups to get interrupted. This is particularly true of the transverse front axle.
- In this case, the spoiler adapter acts as a connecting member between the measuring device holder and the measuring pickup. This causes the measuring pickup to be located 50 mm lower, thereby enabling the measuring beam to pass freely below the spoiler.

3.11 Quick-release mountings



- Quick-release mountings for the wheel alignment of other vehicles with compensation of lateral runout on rims.
- Wheel rims without sensor bore holes (wheel rims for BMW vehicles made by other manufacturers)

3.12 Retaining claws



- The versatile retaining claws and the rubberised retaining claws enable an extremely wide and varied range of clamping variants to be used for the measuring equipment holder, even on exotic, i.e. extremely unusual, light-alloy rims.



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4. Workbay

4.1 Environment

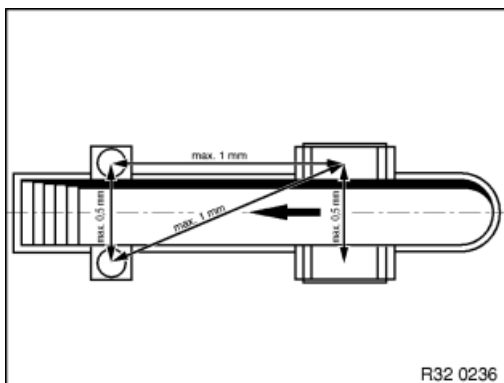
Description:

All the vehicle hoists currently recommended by BMW (cf. Workshop Equipment - Planning Documentation, issue 11) for wheel alignment equipment comply with the requirements for BMW KDS.

Prerequisites:

- Wheel alignment pits
- Telescopic mast vehicle hoists with lowering facility
- 2-stamp vehicle hoists with lowering facility
- Repair statuses with lowering facility
- One measuring station (approx. 4.5 m x 7.0 m).
- The rotational supports ('turntables') must be bolted to the vehicle hoist

The BMW KDS does not impose great demands on its installation location. The device can be used over inspection pits or on vehicle hoists (i.e. workshop ramps).



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The locating surfaces for rotational and sliding plates must not exceed the maximum difference in height described below:

- from left to right ± 0.5 mm
- from front to back ± 1.0 mm
- diagonally ± 1.0 mm.

Note:

A height difference between turntables of ± 2 mm from left to right gives rise to a measuring error with camber of $4,8^\circ$.

For comparison: The camber tolerance on the E36 is $\pm 10'$. Tyre tread difference or different inflation pressures give rise to measuring errors on the same magnitude.

4.2 Prerequisites for the wheel alignment check

During the wheel alignment check, the front and rear wheels need to be standing on the rotational and sliding



supports to enable all wheel suspension points during the touch-sensitive routine and the adjusting procedure to remain free of torsional stresses. This demonstrates the need for the rotational and sliding supports for the various wheelbases and track widths on the candidate vehicle for the wheel alignment check to be relocated.

4.3 Measuring tolerance

The full range of measuring tolerance are system tolerances. That means that the total of all individual tolerances yields the value identified in the argumenter. Example - camber: Quick-release bracket + measuring pickup + computer = 1' with a measuring range of $\pm 3^\circ$ (all BMW vehicles lie within this measuring range).

4.4 Measuring station levelling

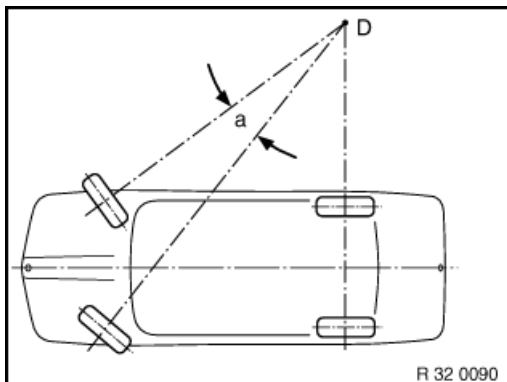
The manufacturers of BMW KDS (Beissbarth / Bosch) are able to check the alignment of the measuring station to the required level of precision, using levelling devices to do so. Bars or hose-type water scales are not suitable. Vehicle hoists must be under load when being levelled to ensure that due account is taken of the uneven deflection in vehicle rails.

Important!

A specialist operator must be involved in the setup work on each vehicle hoist (a member of the manufacturer's Service Product Support staff).

5. Chassis-specific terms

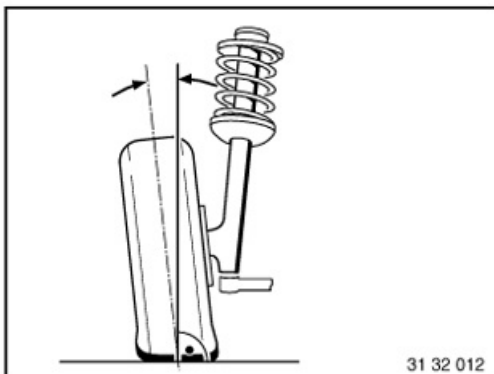
5.1 Toe difference angle



The toe difference angle (a) is the angle setting of the inner cornering wheel relative to the outer cornering wheel when negotiating a bend in the road. Steering is designed in such a way that the relative angular positions of wheels change as steering lock progresses.

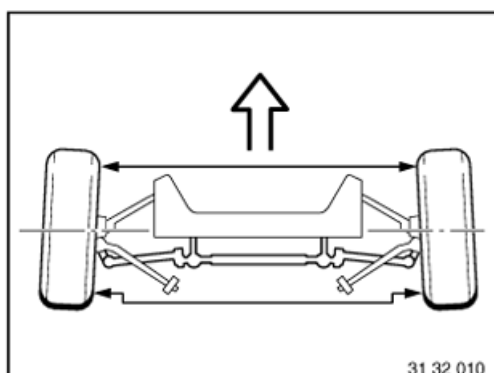
In ideal situations, the wheel axes intersect at Point D in every steering position (except for straight ahead).

5.2 Camber



Camber is the inclination of the wheel from the perpendicular.

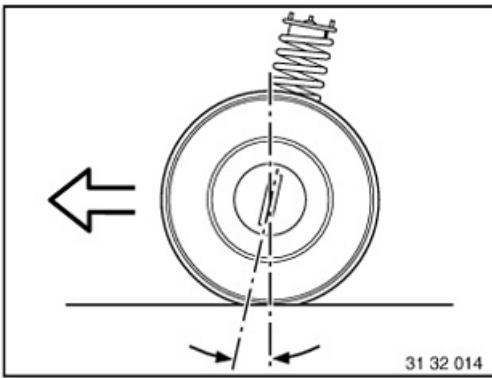
5.3 Toe-in



Toe-in is the reduction in distance of front of front wheels to rear of front wheels. Toe-in prevents the wheels from moving apart when driving (wobbling and scuffing).

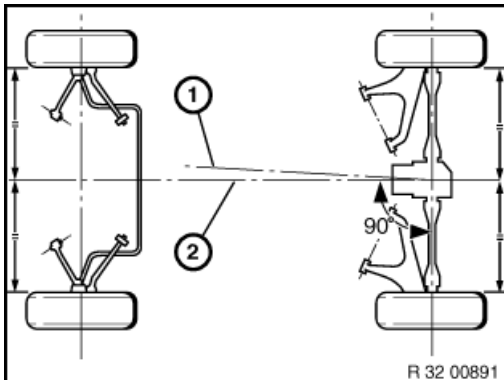
5.4 After-run





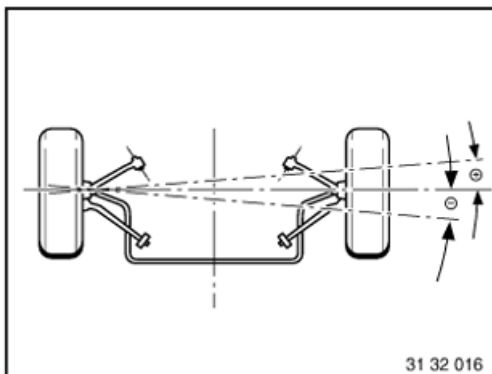
- After-run is the inclination of the kingpin viewed from the side and relative to direction of travel. The line through the centre point of the spring strut support bearing and the control arm ball joint corresponds to the "kingpin".

5.5 Geometrical driving / symmetrical axis



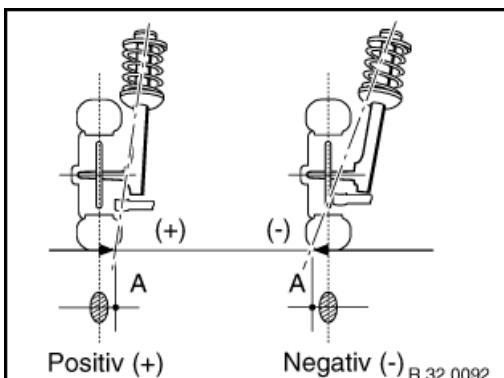
- (1) The geometrical driving axis is the angular intersection point from total toe-in on the rear wheels. Front-wheel measurements are taken in reference to this axis.
- (2) The symmetrical axis constitutes the centreline between front and rear axles.

5.6 Wheel offset angle



- The wheel offset angle is the angular deviation in the intersection line of wheel contact points at a line drawn at 90° to the geometrical driving axis. The wheel offset angle is positive when the right wheel is displaced towards the front and negative when it is displaced towards the rear.

5.7 Kingpin offset / kingpin radius



- The kingpin offset / kingpin radius is the distance from the centre of the wheel contact face to the intersection point of the extension of the kingpin axis.

6. Wheel suspension

Wheel suspension includes the components which connect the wheel to the mostly load-bearing floor pan components on the body which guide the vehicle in the desired direction. This connection involves axles or



comparable construction elements, guided by trailing arms. The type of wheel suspension is one of the determining factors governing the driving characteristics of a vehicle. A distinction is made between two main groups: 1. The rigid axle and 2. The independent suspension.

6.1 Rigid axle

<u>Description</u>	<u>Advantages</u>	<u>Disadvantages</u>
On the rigid axle, both wheels or pairs of wheels are connected by means of a rigid axle body. Every change in a one wheel is transferred to a greater or lesser extent to the other one. If a rigid axle has been installed, it is now only ever as a rear axle. This is sharp contrast to trucks and buses where they are used frequently.	No changes in camber and toe-in occur during suspension action. This means: low tyre wear and good directional stability.	Non-driven rear axles can also receive negative camber and this increases tyre wear.

6.2 Independent suspension

<u>Description</u>	<u>Advantages</u>	<u>Disadvantages</u>
Based on the modern technology standard independent suspension is available on the front and rear axles of BMW vehicles. This development was prompted by inertia mass because a reduction in unsprung masses improves wheel and ground contact, enabling the wheel to maintain better traction. The tracking of independently suspended wheels requires transverse links and trailing arms which can be called upon to absorb occasional high levels of longitudinal and lateral forces.	Independently suspended wheels do not influence one another.	Depending on design, during suspension action, changes can occur in camber, toe-in, track width, after-run and wheelbase.

7. Wheel alignment / test procedure

7.1 Measuring options

The next section itemises all the measuring options and values in an at-a-glance list (FA = front axle, RA = rear axle).

<u>Measuring options</u>	<u>Measuring accuracy</u>	<u>with measuring range</u>	<u>Total measuring range</u>
Total toe-in (FA + RA)	± 2'	± 2°	± 18°
Single wheel toe (FA + RA)	± 2'	± 2°	± 9°
Camber (FA + RA)	± 1'	± 3°	± 10°
Wheel offset (FA)	± 2'	± 2°	± 9°
Geometrical driving axis	± 2'	± 2°	± 9°
Castor	± 4'	± 18°	± 22°
Steering axis inclination	± 4'	± 18°	± 22°
Toe difference angle	± 4'	± 20°	± 20°
Maximum steering angle (FA)	± 4'	± 60°	± 300°
Maximum steering angle (RA)	± 4'	± 9°	± 9°
After-run correction range	± 4'	± 7°	± 10°

Note:

The details for the measuring accuracy only apply when using precision rotational and sliding



supports together with BMW quick release brackets.

7.2 Preparatory work:

Before the measurement can commence, preparatory work is required at the measuring station and on the vehicle (see BMW KDS, operating instructions). This preparatory work includes:

- Ease-of-movement of rotational and sliding plates
- Alignment of rotational and sliding supports to suit track width and wheelbase
- Driving of vehicle centrally onto the supports
- Apply parking brake
- Remove locking pins from the supports to prevent torsional stresses in the chassis and suspension when subjecting the vehicle to load.
- Check the wheel rim and tyre size, tread depth, inflation pressure, steering backlash, wheel bearings and condition of the suspension and shock absorbers
- Secure measuring device bracket to the wheels
- Load vehicle acc. to BMW KDS specification
- Apply sudden load to vehicle with brakes released to obtain a stable centre position.
- Secure the service brake by applying the brake tensioner

7.3 Input / output measurement

This measurement can be conducted as a program-guided measurement check, just like any subsequent adjustment work and the ensuing outgoing alignment check. The sequence of chassis and suspension measuring points to be called up and checked by the systems software. The individual procedural steps cover:

- driving in a straight line to obtain an accurate record of the toe-in and camber value for the rear axle
- touch-sensitive routine to determine after-run, steering axis inclination and toe difference angle
- Recording of toe-in and camber of front axle (prior to this, set the steering centrepont)
- touch-sensitive routine to measure the maximum steering angle on left and right sides
- Checking the measuring value summary with nominal / actual comparison of all measured values.

7.4 Printout of the data

[illegible]

The report printout from the integrated DIN-A4 printer is subdivided into three areas:

- Headers with customer and vehicle identification data --> here, the customer data entered before the start of measuring work are printed out together with the vehicle data.
- Centre section with vehicle data --> these include brand, type, model and model year of the vehicle, as defined during selection of the nominal data record. Furthermore, this section involves printing out the previously measured values for ride height, inflation pressure and tread depth.



- The final section with all chassis and suspension measuring values comprises 3 columns: incoming wheel alignment check, nominal values and outgoing measurement. The measured values are recorded separately in these 3 columns.

8. Special features

8.1 Wheel alignment with non-selective access

During wheel alignment checks with non-selective access, the selection and sequence of measuring points can be made in any desired order. When doing this, the following points must be observed in order to achieve the correct measuring results:

- Carry out all work as defined during the program-guided wheel alignment check.
- Before the alignment check of toe-in and camber values on the rear axle, the steering must be set in its 'straight-ahead' position to ensure that it is aligned with the vehicle's centre axis.
- Prior to the alignment check of individual toe-in values on the front axle, the steering wheel centre position needs to be determined to ensure that the steering wheel is in its correct position.

8.2 System settings

The following settings only need to be entered and set once: language, display format, date/time, promotional text, remote control with display, selection of rotary plate and printer setting. These remain saved in memory.

9. Comparison, BMW KDS (Bosch - Beissbarth)

	<u>Bosch</u>	<u>Beissbarth</u>
Recording of measuring values	Infrared	Image sensor
Data transmission	Cable	Infrared / cable
Voltage supply to the pickups	Cable	Accumulator / cable
Master key	Infrared	Infrared
Master key with measuring value display	Cable	Infrared
Nominal data memory	Disk	Hard disk
Measuring value memory	Always the last vehicle measured	unlimited vehicle memory capacity
Operating system	---	MS-DOS
Languages	English and one language on order	EN, DE, NI, SV, IT, FR, SP (other languages on request)
Update	3.5" diskette	3.5" diskette from TIS/DIS
Monitor	20"	17"
Computer	---	Pentium
Drives	2 x diskette	1 x diskette, 1 x CD-Rom

10 Change in operation (menu)

10.1 Master key with display

The process of enabling the master key with display is described in the following procedural steps:

1. in the special functions (button "**S**"), call up the "**Service**" menu
2. In the "**Service**" menu, call up the "**Master key**" submenu
3. In the "**Master key**" submenu, select the "**Master key with display**" point - this is a once-only setting.

Important!

On devices without master key, this setting must be set to "**No master key**".

10.2 Summary of operating instructions

1. Switch on the master key by pressing the "**ON**" button (it is permissible to switch this on during the alignment check). The title screen then appears on the LCD.



2. On the measuring equipment cabinet, select "**Straight-ahead driving**" for the "**Incoming alignment check**", then "**Adjusting procedure**" or the "**Outgoing alignment check**". The following graphic appears on the LCD monitor for "**Driving straight ahead**".
3. Pressing the "**Forwards arrow**" calls up the next measuring screen. What next appears on the LCD display blocks are a designation of the measured value and a tolerance bar with measured value. If that measured value is within tolerance, this is depicted with black numerals on a light background. If that measured value lies outside the tolerance, it is then displayed in inverted fashion (i.e. light numerals on a dark background).
4. Pressing the "**F**" button briefly makes it possible to alternate between the designation of the measured value and the nominal value with tolerance within the display block.
5. To scroll onwards through the measured values, press the "**Forward arrow**", "**Backward arrow**" and the "**Cancel**" keys (red spot). The function of this button is identical to that of the buttons/keys on the graphics pad.
6. Even when opting for the "**Alignment check with non-selective access**", the measured values can be chosen in the same way as for the "program-guided alignment check" process.
7. Using the "**Printer**" button enables reports to be printed out during the alignment check. The remote control buttons are only enabled during the measurement and setting process (not in response to customer input, choice of vehicle, etc.).

10.3 Display support

- Measured values with nominal/actual comparison and tolerance bar (nominal values can be displayed by pressing the "**F**" key/button)
- Touchscreen icon for touch-sensitive routines
- Summary of measured values with the latest nominal / actual comparison
- Compensation for lateral runout on wheel rims
- With all other functions (e.g. customer input), the title image appears on the liquid crystal display

Note:

Whenever data transfer from the master key / remote control to the computer is interrupted, the master key icon in the lower right-hand corner of the screen changes colour from green to red and the image on the LCD display is depicted in inverted format, i.e. black becomes white and vice versa. This changeover does not occur in the title image. Once visual connection is re-established, the master key recommences work at the point in the program where the interruption occurred. Continuous visual connection during the alignment check is therefore not necessary.

- The "**Egg timer**" icon on the LCD display indicates: "**Please wait**".
- The "**Battery**" icon in the upper right-hand corner of the LCD display indicates that the battery reserve has been reached.
- Switching off the remote control / master key: Press and hold down the "**F**" key for 5 seconds, then place in the charge bracket or plug in the charging cable. The title image then reappears as the charge indicator light.
- If the master key is placed in the charge bracket during the alignment check process, it must when required be switched on using the "**ON**" key.

11 Updating the software / nominal data

No more diskettes will be sent out to any BMW authorised workshops who in the past subscribed to "**BMW KDS** (Beissbarth / Bosch)". For reasons of cost, it is no longer possible to produce these diskettes in-house on the "**DIS tester**" or on the "**TIS/EPC server**". The data are updated on the TIS-CD on a regular basis

11.1 Prerequisites

- BMW KDS (Beissbarth / Bosch)
- Program status (Beissbarth) TIS-CD: from CD 12/95
- Program status EPC: from 12/95
- Program status (Bosch) TIS-CD: from CD 08/97
- Program status DIS: from V6.0
- Diskettes, 3.5", 1,44 MB (Beissbarth 5 diskettes / Bosch 1 diskette)

11.2 Procedure (Beissbarth)



1. Go into screen mask "**Administration**"
2. Select **KDS button**
3. Select **Beissbarth**
4. After request, load "**diskette 1**" and acknowledge with "**OK**" (program diskette 1 of 2 is created, perform labelling operation)
5. After request, load "**diskette 2**" and acknowledge with "**OK**" (program diskette 2 of 2 is created, perform labelling operation)
6. After request, load "**diskette 3**" and acknowledge with "**OK**" (program diskette 1 of 3 is created, perform labelling operation)
7. After request, load "**diskette 4**" and acknowledge with "**OK**" (program diskette 2 of 3 is created, perform labelling operation)
8. After request, load "**diskette 5**" and acknowledge with "**OK**" (program diskette 3 of 3 is created, perform labelling operation)
9. Perform software update and /or nominal data input on the KDS in the usual manner using the manufactured diskettes.

11.3 Procedure (Bosch)

1. Go into screen mask "**Administration**"
2. Select **KDS button**
3. Select **Bosch**
4. Write a name on "**Diskette 3.1**", when prompted to do so, insert in the drive and confirm by pressing "**OK**" (2x) --> nominal values are then copied to the diskettes
5. Load nominal value diskette 3.1 in drive 3.1, load operating system diskette 3.0 in drive 3.0.
6. Boot device in the usual manner

Important!

When producing KDS diskettes, all data on the diskettes used are overwritten.

Note:

Whenever an error occurs, this is displayed and the program aborts. This process needs to be restarted from the very beginning, which involves deleting all data from the diskette. Possibly use a new diskette.

12. Creating, copying and editing nominal data

12.1 Copying

- Press the "**C**" button and select the vehicle which is to be copied.
- In the special function section, select menu item "**Editing of nominal data**". Set up a new vehicle record in the familiar way. Now the data input screen displays the nominal values for the previously selected vehicle. Re-enter the modified data and save the data record.

12.2 Create

- Press the "**C**" button and, in the special function, select the "**Editing of nominal data**" menu item. Set up a new vehicle record in the familiar way. An empty data input screen now appears. Enter the data and save the data record.

12.3 Edit

- Nominal data programmed in the factory cannot be deleted or changed. If these data are changed, a new vehicle record with those amended nominal data needs to be set up. New vehicle records set up by the user are designated as such in the selection menu with a "+". These vehicles can be deleted by the user by means of the screen button "-" or can be amended using the "<>" button. These buttons only appear on the screen if the vehicles were entered in the system by the user.

13. Special functions

13.1 Customer button for printer protocol

In the "**Special function**" menu, the "**Customer-specific text**" submenu can be called up. An input screen appears on the display. A name and address must be added to this input screen and saved by pressing the "**S**" screen button. The text entered is then imprinted in the header of the protocol / report.

13.2 Alignment options



- in the special functions (button "**S**"), call up the "**Service**" menu
- In the submenu "**alignment**", select the "**Toe-in alignment**" or the "**Toe-in adjustment**" option. The toe-in and camber alignment program guides the user step by step through the alignment process with the help of text and images. At the end of the adjustment process, the deviation in measuring value from every measuring sensor is displayed on the screen.
- These alignment values can be saved in the measuring pickup memory by pressing "**Save**" or the program can be quit by pressing the "**Red button**" without saving (a checking function). The alignment values can be printed out.

13.3 Turntable test

- in the special functions (button "**S**"), call up the "**Service**" menu
- In the "**Service**" menu, call up the "**Turntable test**" function. Rotate left and right-hand turntables and check the display on the screen. Important: The measuring range is ± 306 degrees.

13.4 View and delete customer entries from the database

- In the special functions in the "**Database**" menu, call up the "**Delete**" menu option. The data input screen then appears. Fill in the search boxes with the data to be deleted.
- Using the "-" button, this data record can be deleted. It is now possible to use the touchscreen pen to highlight and delete a new data record.
- The screen buttons "**Arrow up**" and "**Arrow down**" enable users to scroll through the entire database.
- To quit the Delete function, press the Cancel button (red spot).

14. Internal program change

Other internal program changes were made which only slightly alter the program run, but which do optimise the alignment check in terms of comfort and speed. This is described in the following pages:

- Optimisation of compensation for lateral runout on wheel rims in relation to speed.
- Optimisation of impact routines: Marking can still be corrected within the gateway. The message "**Turntables not connected**" no longer causes this routine to terminate. Measuring can continue after the turntables have been plugged back in.
- Standardisation of screen colours with the colours on the panel.
- Extension of texts in some foreign languages.
- Elimination of program and cosmetic errors.
- Electronic water scales
- Discontinuation of wheelbase measurement

15. Faults

15.1 Tyre faults

<u>Error</u>	<u>Impact</u>
1 Tracking, camber, toe difference angle and caster not correct	1 Serious tyre squeak, even at relatively low speeds
2 Too much toe-in or too much positive camber	2 Tyres are worn longitudinally down one outside edge
3 Too much negative camber	3 Tyre wear on inner edge



- | | |
|---|--|
| 4 Worn front axle suspension points on FWD cars | 4 Amplified noise /

Vehicle pulls away one-sidedly when accelerating |
| 5 Incorrect toe adjustment | 5 Radial adjustment of wheel settings /

tyre tread exhibits burr formation within the tread pattern |
| 6 Play in wheel suspension caused by mechanical components (suspension, steering) | 6 Washed out areas /

wobbling on front wheel |
| 7 Insufficient inflation pressure in the tyre | 7 Tyre wear along outer areas |

15.2 Front axle fault

<u>Fault</u>	<u>Cause</u>	<u>Remedy</u>
1. Toe deviation	a) Vehicle not in normal position	a) Correct ride height
	b) Tie rod(s) bent	b) Replace tie rod(s)
	c) Ball joints on track rod(s) misaligned	c) Replace tie rod(s)
	d) Rubber mount in control arm faulty	d) Replace control arms
2. Camber deviation: Camber is defined by design and cannot be adjusted.	a) Rubber mount in control arm faulty	a) Replace control arms
	b) Control arm deformed	b) Replace control arms
	c) Spring strut deformed	c) Replace spring strut
	d) Guide joint worn	d) Replace control arms
	e) Spring deflection too great	e) Replace coil spring, ride height



	f) Front axle carrier deformed	f) Replacing front axle support
	g) Spring strut shock absorber mount misshapen	g) Repair front end
	h) Distortion in floor assembly (engine carrier)	h) Repair body
3. Castor deviation: Caster is defined by design and cannot be adjusted	a) Rubber mount for tension/traction strut defective	a) Replace rubber mount
	b) Tension/traction strut misshapen	b) Replace tension/traction strut,
	c) Control arm deformed	c) Replace control arms
	d) Spring strut deformed	d) Replace spring strut
	e) Wheel house deformed (spring-strut mount)	e) Repair front end
	f) Distortion in floor assembly (engine carrier)	f) Repair body
4. Toe angle difference deviation	Prerequisite: camber and caster are correct	
	a) Tie rods not adjusted uniformly	a) Adjust toe on left and right sides to same value
5. Wheel-offset deviation	Prerequisite: front wheels have equal single toe to geometrical axis	
	a) Front axle carrier deformed	a) Replacing front axle support
	b) Engine carrier deformed	b) Repair body
	c) Control arm deformed	c) Replace control arms



d) Tension/traction strut
misshapen

d) Replace tension/traction strut

15.3 Rear axle defects

<u>Fault</u>	<u>Cause</u>	<u>Remedy</u>
1. Camber deviation	a) Vehicle not in normal position, spring deflection too great	a) Correct ride height
	b) Rubber mount on rear axle carrier unserviceable	b) Replace rubber mount
	c) Rear axle carrier deformed	c) Check rear-axle carrier, replace if necessary
	d) Control arm deformed	d) Check/replace control arm
	e) Traction strut misshapen	e) Check traction strut, replace if necessary
	f) Distortion in floor assembly	f) Repair body
	g) Swinging arm deformed	g) Replace swinging arm
2. Rear-wheel position incorrect	a) Rear axle carrier displaced laterally	a) Check rubber mounts on rear- axle carrier, replace if necessary
	b) Distortion in floor assembly	b) Repair body
3. Toe deviation	a) Vehicle not in normal position, i.e. spring deflection too great	a) Correct ride height
	b) Rubber mounts in rear-axle carrier faulty	b) Replace rubber mount
	c) Control arm deformed	c) Replace control arms
	d) Rubber mount and swinging arm unserviceable	d) Replace swinging arm



e) Rear axle carrier deformed

e) Check rear-axle carrier,
replace if necessary

f) Traction strut misshapen

f) Check traction strut, replace if
necessary

Prerequisite: rear wheel total toe
value must be correct.

4. Deviation from the geometric
axis

a) Distortion in floor assembly

a) Repair body

Other notes on the topic of the "kinematics diagnosis system" can be found in the BMW KDS (Beissbarth / Bosch) operating instructions.

None of the function and system descriptions are covered by an update service. Availability of parts and scope for immediate ordering cannot be derived from this information. The specialist departments shall be in touch with the markets at an appropriate time with further details.



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Kinematics diagnosis system and environment

BMW KDS (Beissbarth)

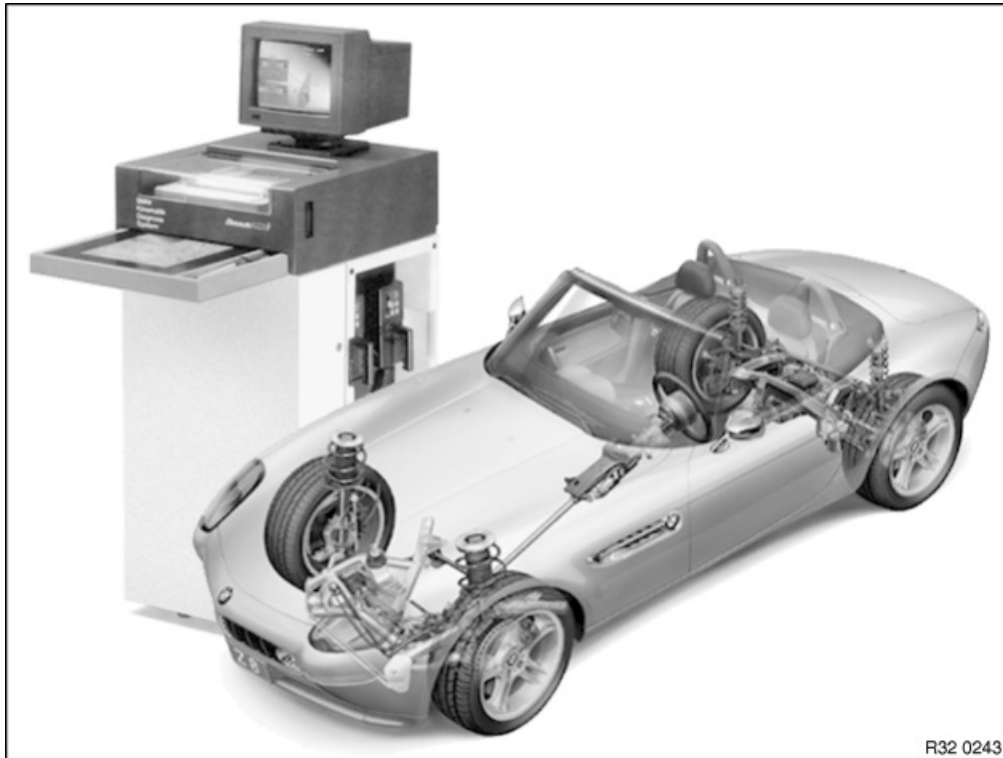


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15.2 Front axle fault

15.3 Rear axle fault

1 Preface

1.1 Objective

The complexity of wheel alignment as a topic has increased. This BMW Service Technology document is therefore intended to achieve several objectives:

- Compiling guidelines for working with the BMW KDS.
- Getting to grips with the technology of wheel alignment on modern vehicles and clarifying any questions that arise.
- Transparency and clarification of different terminology.
- Clarification of fault causes from the past, so that these can be avoided in future after studying this paper.
- Prerequisites for safe dealings with BMW KDS.

1.2 Further development of the BMW kinematics diagnosis system

- The BMW kinematics diagnosis system (KDS) forms an integral element of systems-based philosophy in relation to automotive technology. This provides the peace of mind of being able to work rationally and in a BMW-compliant manner, and the certainty of being prepared for future technological developments. With regard to precision and performance in the area of wheel alignment and chassis adjustment, BMW has done the best it can with what is technologically feasible: The BMW kinematics diagnosis system (KDS).
- The BMW kinematics diagnosis system from Beissbarth is more than just a further development of conventional axle alignment equipment. It sets new dimensions in terms of precision, performance, speed and handling. Guarantees for the perfection upon which BMW customers count in their dealings with BMW Service.
- Ride comfort, driving safety and tyre wear depend to a large extent on perfect interaction with vehicle kinematics. BMW is constantly delivering new generations of chassis and suspension to the market, each of which is superior and/or even closer to perfection than its predecessor. That means that there are fewer kinematic adjustment points on the chassis and suspension and even tighter specified tolerances with regard to wheel alignment and adjustment.
- Through the use of the multilink rear axle and the E36, the previously recommended electronic wheel alignment equipment was no longer suitable for BMW chassis alignment checks. This related to the measuring procedure as well as to the measuring accuracy. The generation of equipment approved with the introduction of the E36 range is still able today to satisfy all the requirements imposed on modern wheel alignment equipment, including the use of the latest computer technology.
- For wheel alignment purposes, only the BMW kinematics diagnosis systems from Beissbarth and Bosch may be used.

1.3 Technical data





- | | | |
|----|-------------------------|---|
| 1. | Display | - 17 inch graphics screen with high-resolution graphics (640x480 pixels with 256 colours) |
| 2. | Teletext | - in each programmed national language |
| 3. | Wheel sizes | - 12"...20" |
| 4. | Vehicle memory capacity | - unlimited |
| 5. | Turntables | - Load-carrying capacity 1000 kg, angle of rotation $\pm 360^\circ$, 450 x 450 x 50mm (L x B x H), sliding range ± 50 mm, weight 18 kg |
| 6. | Sliding supports | - Load-carrying capacity 1000 kg, angle of rotation $\pm 10^\circ$, 450 x 450 x 50mm (L x B x H), sliding range ± 65 mm, weight 17 kg |
| 7. | Electrical connection | - 100...115 V / 220...240 V 50/60 Hz, 0,5 kW (other connections on request) |

1.4 Delivery specification

- 1 PC display element with graphics screen, graphics panel, equipment cabinet, small or large including automatic charging station, DIN-A4 dot matrix printer
- 4 Pickup with CCD camera technology and infrared data transfer, with installed voltage supply
- 1 Wiring harness (comprising 4 cables)
- 1 Brake tensioner
- 1 Steering wheel lock
- 2 Electronic precision turntable supports with integrated sensor and without approach ramp
- 2 Sliding supports without approach ramp



4 BMW quick-release units comprising a locating bell housing P8-68 and quick-release bracket P267 01, incl. coated retaining claws

1 Operating instructions for BMW KDS (8 languages)

1 BMW software and the BMW nominal vehicle data with adjustment images as well as texts for measurement preparations

1.5 Required accessories

2 Locking rods for positioning the vehicle

1 Set of sandbags for specified loading

1.6 Advisable accessories

4 Quick-clamping units

2 Set of collision plates

1 Remote control / display

1 Transport carriage (for ballast pockets, turntables and sliding plates, and 4 quick-release brackets)

2 Measuring options with the BMW KDS

2.1 Front axle

- Toe-in (individual wheel and total toe-in relative to the geometrical driving axis)
- Camber (when driving straight ahead)
- Wheel offset (relative to the left front wheel)
- After-run, steering axis inclination and toe difference angle

2.2 Rear axle

- Toe-in (individual wheel and total toe-in relative to the central plane of the vehicle's longitudinal axis --> previously known as the symmetrical axis)
- Geometrical driving axis
- Camber

2.3 Other measuring options

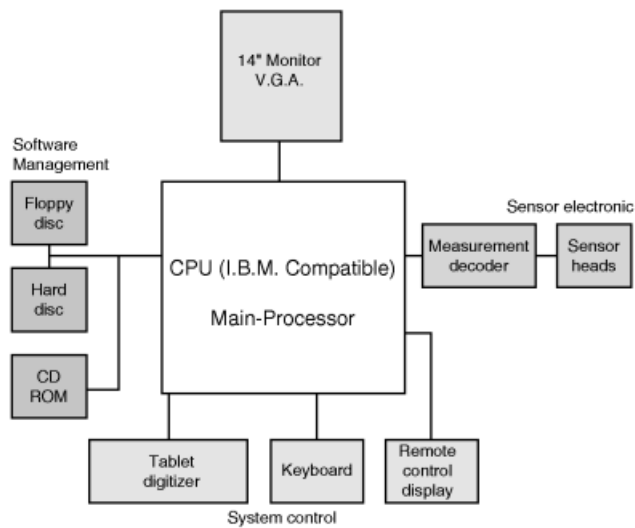
- Wheel offset, rear
- Wheelbase difference
- Lateral offset, right
- Lateral offset, left
- Track width difference
- Axial offset

3. System description

3.1 BMW KDS 1, based on the ML 4000 from Beissbarth



microline 4000 system concept



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The KDS 1 is available without surcharge in a choice of two design versions:

1. Mobile workstation



R32 0250

2. Mobile compact cabinet



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The larger workstation provides a small storage space for accessories, whereas the compact cabinet is mobile and is ideal for confined working areas. Both versions are available as a wireless measuring system (infrared). In terms of measuring technology, the only difference between these two systems is in their handling and their upgrade options. In both these versions, the four pickups are stored in integrated inserts with battery charge points. Following the automatic charging process, the accumulators on the pickups deliver enough power for 10 hours of continuous operation.

3.2 Computer

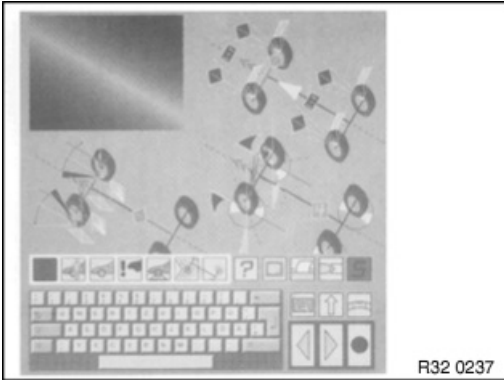
- KDS system 1 comprises tried-and-tested and thoroughly reliable industrial components. The computer is an IBM-compatible 32-bit Intel processor with CD drive, of the kind commonly used in the PC sector.





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3.3 Graphics pad



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All functions are depicted graphically on a "Symbol" pad. The pad is protected beneath a Plexiglas panel. This is easy to replace whenever major design changes are required. The user interface has no membrane and is therefore safely protected against damage. The main functions are enabled by clicking the symbol with the sensor probe.

3.4 Equipment cabinet



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The PC with graphics monitor and pull-out operating pad, mountings for the pickups, the remote control and the DIN-A4 printer are integrated on the workstation. The charging station is located in the cabinet and can also be connected to the pickups and remote control unit by plug-in cables (operation with simultaneous charging of the accumulators / rechargeable batteries).

3.5 Remote display



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A wireless remote display unit can be provided on request. The remote control buttons are only enabled during the measurement and setting process (not in response to customer input, choice of vehicle, processing of nominal data etc.). The following displays are supported by the remote display facility:

- Measured value with nominal/actual variance comparison and tolerance bar
- Touchscreen icon for touch-sensitive routines
- Live overview of toe-in / camber values with nominal / actual comparison
- Rims, lateral runout compensation

3.6 Measuring pickup with image sensors (CCD cameras)

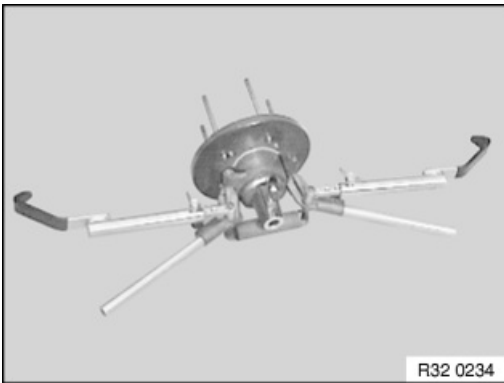




Each of the measuring pickups is equipped with two image sensors and its own processor for wireless infrared transmission with integrated accumulators for automatic measurement. Advantages:

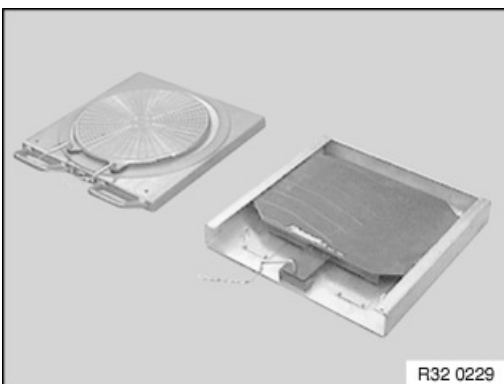
- No temperature deviation
- Very high measuring resolution (theoretically, toe-in could be measured in seconds of an angle).
- Single toe-in range of more than ± 9 degrees relative to constant screen display of toe-in during the replacement of track rod ends
- Exact system precision, i.e. with measurements on the vehicle following rim lateral runout compensation: an accuracy of 2 minutes of angle for toe-in and camber

3.7 BMW quick-release brackets



- BMW quick-release brackets for precise mounting of measuring pickups and measurement without compensation of lateral runout on rims.
- **Note:** Quick-release brackets potentially available, e.g. from older F1600 or ML-3000 models, must not be used with the BMW KDS.

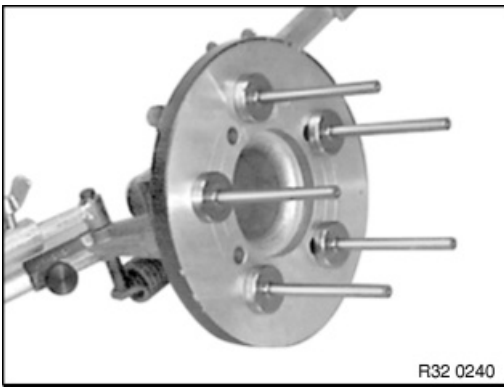
3.8 Rotational / sliding supports



- Electronic precision turntables (rotational supports) for the front wheels with integrated sensor (360 degrees all-round measuring range)
- Robust sliding supports for the rear wheels with a swivelling / rotating upper plate.
- Accessories: Cover for aluminium rotational supports / turntables

3.9 Sensor probes





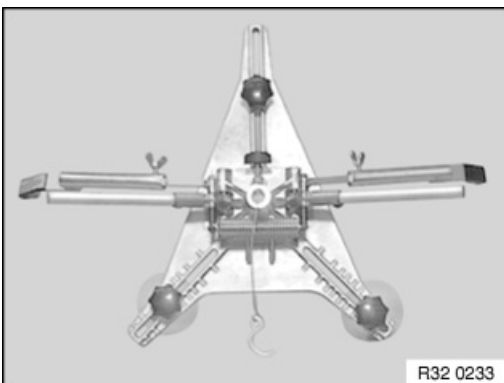
- From April 1993, a new BMW light-alloy wheel (styling No. 18) has been available as a BMW optional accessory. During vehicle alignment checks on these wheels, new sensor probes are required for the quick-release mountings on the recommended wheel alignment equipment.
- On recent deliveries of KDS 1, the new sensor probes are included in the delivery specification (order number: BS 90 19 11).

3.10 Spoiler adapters



- On vehicles with very deep spoilers, it is possible for the measuring beam between the measuring pickups to get interrupted. This is particularly true of the transverse front axle.
- In this case, the spoiler adapter acts as a connecting member between the measuring device holder and the measuring pickup. This causes the measuring pickup to be located 50 mm lower, thereby enabling the measuring beam to pass freely below the spoiler.

3.11 Quick-release mountings



- Quick-release mountings for the wheel alignment of other vehicles with compensation of lateral runout on rims.
- Wheel rims without sensor bore holes (wheel rims for BMW vehicles made by other manufacturers)

3.12 Retaining claws



- The versatile retaining claws and the rubberised retaining claws enable an extremely wide and varied range of clamping variants to be used for the measuring equipment holder, even on exotic, i.e. extremely unusual, light-alloy rims.



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4. Workbay

4.1 Environment

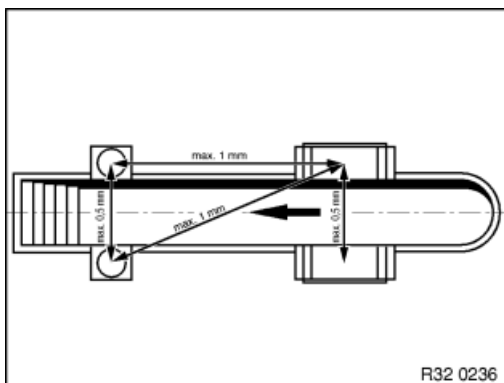
Description:

All the vehicle hoists currently recommended by BMW (cf. Workshop Equipment - Planning Documentation, issue 11) for wheel alignment equipment comply with the requirements for BMW KDS.

Prerequisites:

- Wheel alignment pits
- Telescopic mast vehicle hoists with lowering facility
- 2-stamp vehicle hoists with lowering facility
- Repair statuses with lowering facility
- One measuring station (approx. 4.5 m x 7.0 m).
- The rotational supports ('turntables') must be bolted to the vehicle hoist

The BMW KDS does not impose great demands on its installation location. The device can be used over inspection pits or on vehicle hoists (i.e. workshop ramps).



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The locating surfaces for rotational and sliding plates must not exceed the maximum difference in height described below:

- from left to right ± 0.5 mm
- from front to back ± 1.0 mm
- diagonally ± 1.0 mm.

Note:

A height difference between turntables of ± 2 mm from left to right gives rise to a measuring error with camber of $4,8^\circ$.

For comparison: The camber tolerance on the E36 is $\pm 10'$. Tyre tread difference or different inflation pressures give rise to measuring errors on the same magnitude.

4.2 Prerequisites for the wheel alignment check

During the wheel alignment check, the front and rear wheels need to be standing on the rotational and sliding



supports to enable all wheel suspension points during the touch-sensitive routine and the adjusting procedure to remain free of torsional stresses. This demonstrates the need for the rotational and sliding supports for the various wheelbases and track widths on the candidate vehicle for the wheel alignment check to be relocated.

4.3 Measuring tolerance

The full range of measuring tolerance are system tolerances. That means that the total of all individual tolerances yields the value identified in the argumenter. Example - camber: Quick-release bracket + measuring pickup + computer = 1' with a measuring range of $\pm 3^\circ$ (all BMW vehicles lie within this measuring range).

4.4 Measuring station levelling

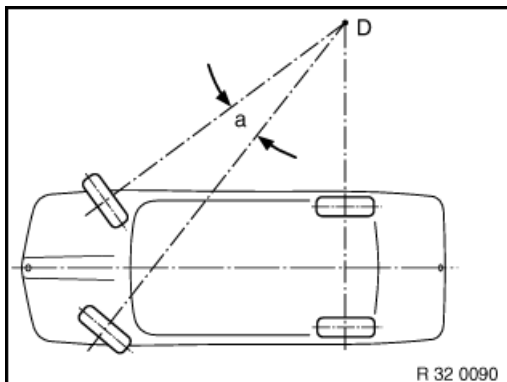
The manufacturers of BMW KDS (Beissbarth / Bosch) are able to check the alignment of the measuring station to the required level of precision, using levelling devices to do so. Bars or hose-type water scales are not suitable. Vehicle hoists must be under load when being levelled to ensure that due account is taken of the uneven deflection in vehicle rails.

Important!

A specialist operator must be involved in the setup work on each vehicle hoist (a member of the manufacturer's Service Product Support staff).

5. Chassis-specific terms

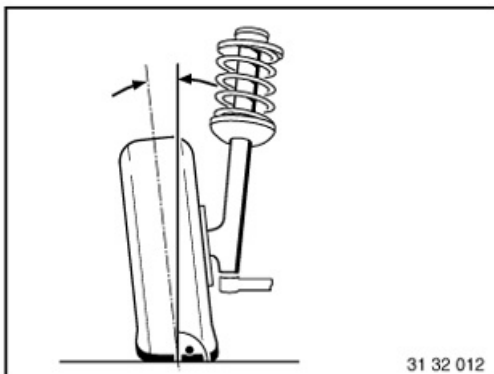
5.1 Toe difference angle



The toe difference angle (a) is the angle setting of the inner cornering wheel relative to the outer cornering wheel when negotiating a bend in the road. Steering is designed in such a way that the relative angular positions of wheels change as steering lock progresses.

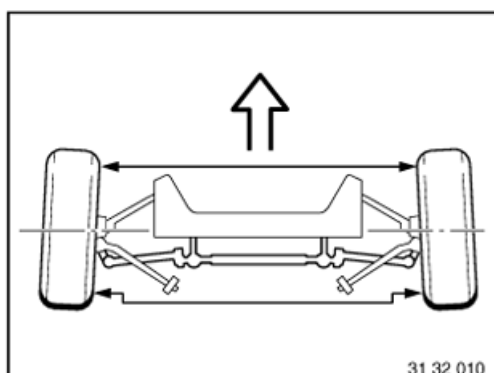
In ideal situations, the wheel axes intersect at Point D in every steering position (except for straight ahead).

5.2 Camber



Camber is the inclination of the wheel from the perpendicular.

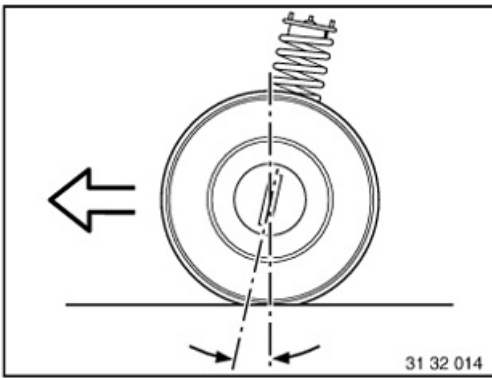
5.3 Toe-in



Toe-in is the reduction in distance of front of front wheels to rear of front wheels. Toe-in prevents the wheels from moving apart when driving (wobbling and scuffing).

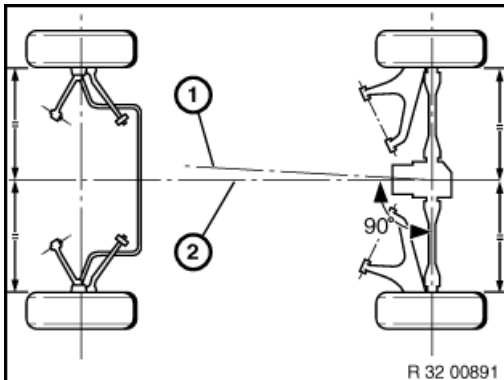
5.4 After-run





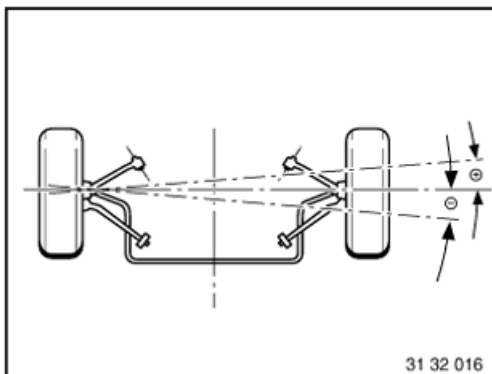
- After-run is the inclination of the kingpin viewed from the side and relative to direction of travel. The line through the centre point of the spring strut support bearing and the control arm ball joint corresponds to the "kingpin".

5.5 Geometrical driving / symmetrical axis



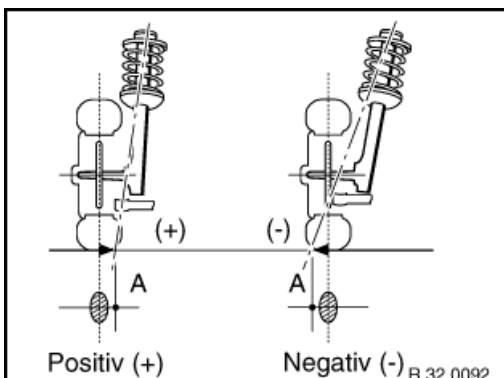
- (1) The geometrical driving axis is the angular intersection point from total toe-in on the rear wheels. Front-wheel measurements are taken in reference to this axis.
- (2) The symmetrical axis constitutes the centreline between front and rear axles.

5.6 Wheel offset angle



- The wheel offset angle is the angular deviation in the intersection line of wheel contact points at a line drawn at 90° to the geometrical driving axis. The wheel offset angle is positive when the right wheel is displaced towards the front and negative when it is displaced towards the rear.

5.7 Kingpin offset / kingpin radius



- The kingpin offset / kingpin radius is the distance from the centre of the wheel contact face to the intersection point of the extension of the kingpin axis.

6. Wheel suspension

Wheel suspension includes the components which connect the wheel to the mostly load-bearing floor pan components on the body which guide the vehicle in the desired direction. This connection involves axles or



comparable construction elements, guided by trailing arms. The type of wheel suspension is one of the determining factors governing the driving characteristics of a vehicle. A distinction is made between two main groups: 1. The rigid axle and 2. The independent suspension.

6.1 Rigid axle

<u>Description</u>	<u>Advantages</u>	<u>Disadvantages</u>
On the rigid axle, both wheels or pairs of wheels are connected by means of a rigid axle body. Every change in a one wheel is transferred to a greater or lesser extent to the other one. If a rigid axle has been installed, it is now only ever as a rear axle. This is sharp contrast to trucks and buses where they are used frequently.	No changes in camber and toe-in occur during suspension action. This means: low tyre wear and good directional stability.	Non-driven rear axles can also receive negative camber and this increases tyre wear.

6.2 Independent suspension

<u>Description</u>	<u>Advantages</u>	<u>Disadvantages</u>
Based on the modern technology standard independent suspension is available on the front and rear axles of BMW vehicles. This development was prompted by inertia mass because a reduction in unsprung masses improves wheel and ground contact, enabling the wheel to maintain better traction. The tracking of independently suspended wheels requires transverse links and trailing arms which can be called upon to absorb occasional high levels of longitudinal and lateral forces.	Independently suspended wheels do not influence one another.	Depending on design, during suspension action, changes can occur in camber, toe-in, track width, after-run and wheelbase.

7. Wheel alignment / test procedure

7.1 Measuring options

The next section itemises all the measuring options and values in an at-a-glance list (FA = front axle, RA = rear axle).

<u>Measuring options</u>	<u>Measuring accuracy</u>	<u>with measuring range</u>	<u>Total measuring range</u>
Total toe-in (FA + RA)	± 2'	± 2°	± 18°
Single wheel toe (FA + RA)	± 2'	± 2°	± 9°
Camber (FA + RA)	± 1'	± 3°	± 10°
Wheel offset (FA)	± 2'	± 2°	± 9°
Geometrical driving axis	± 2'	± 2°	± 9°
Castor	± 4'	± 18°	± 22°
Steering axis inclination	± 4'	± 18°	± 22°
Toe difference angle	± 4'	± 20°	± 20°
Maximum steering angle (FA)	± 4'	± 60°	± 300°
Maximum steering angle (RA)	± 4'	± 9°	± 9°
After-run correction range	± 4'	± 7°	± 10°

Note:

The details for the measuring accuracy only apply when using precision rotational and sliding



supports together with BMW quick release brackets.

7.2 Preparatory work:

Before the measurement can commence, preparatory work is required at the measuring station and on the vehicle (see BMW KDS, operating instructions). This preparatory work includes:

- Ease-of-movement of rotational and sliding plates
- Alignment of rotational and sliding supports to suit track width and wheelbase
- Driving of vehicle centrally onto the supports
- Apply parking brake
- Remove locking pins from the supports to prevent torsional stresses in the chassis and suspension when subjecting the vehicle to load.
- Check the wheel rim and tyre size, tread depth, inflation pressure, steering backlash, wheel bearings and condition of the suspension and shock absorbers
- Secure measuring device bracket to the wheels
- Load vehicle acc. to BMW KDS specification
- Apply sudden load to vehicle with brakes released to obtain a stable centre position.
- Secure the service brake by applying the brake tensioner

7.3 Input / output measurement

This measurement can be conducted as a program-guided measurement check, just like any subsequent adjustment work and the ensuing outgoing alignment check. The sequence of chassis and suspension measuring points to be called up and checked by the systems software. The individual procedural steps cover:

- driving in a straight line to obtain an accurate record of the toe-in and camber value for the rear axle
- touch-sensitive routine to determine after-run, steering axis inclination and toe difference angle
- Recording of toe-in and camber of front axle (prior to this, set the steering centrepont)
- touch-sensitive routine to measure the maximum steering angle on left and right sides
- Checking the measuring value summary with nominal / actual comparison of all measured values.

7.4 Printout of the data

BMW KDS Kleinmotik Diagnose System								
Kunden Nr.			Fahrer Nr.					
Leitzahl			Technikerkennzahl					
Kunde			Erstschaltung					
Anst. Kennz.			Datum 01.12.1994 11:21					
Userwahl								
Fahrbetrieb * BMW * Typ 0 36 * 010 * Serie * 1791gje								
Kontrolllampe			Kontrolllampe					
Leuchtwert			Leuchtwert					
428 mm ± 02 mm - 02 mm			104 mm ± 02 mm - 02 mm					
Kunden-Leuchte/Kategorie/KP/KP								
Kunden-Profikategorie								
		links		rechts				
		rechts		links				

		Ein- gangs- wert		Schlepp- max. Differenz line		Aus- gangs- wert	
Hinter- achse	Streu	links	rechts	links	rechts	links	rechts
		1717	17301	40200	40200	1718	17301
		0700	0700	0700	0700	0700	0700
	Spur	links	rechts	links	rechts	links	rechts
		40117	40117	40117	40117	40117	40117
		gesamt	40118	40118	40118	40118	40118
Vorder- achse	Fahrschwenkwinkel		links	rechts	links	rechts	links
			40117	40117	40117	40117	40117
	Nachlauf		links	rechts	links	rechts	links
			1718	17301	40200	40200	1718
	Spurabweichungswinkel		links	rechts	links	rechts	links
			17301	17301	40200	40200	17301
	Streu		links	rechts	links	rechts	links
			40117	40117	40117	40117	40117
	Spur	links	rechts	links	rechts	links	rechts
		40117	40117	40117	40117	40117	40117
		gesamt	40118	40118	40118	40118	40118
	Radkonvergenz		links	rechts	links	rechts	links
		40117	40117	40117	40117	40117	40117
Maximale Leuchtwert am linken vorne Rad	links	rechts	links	rechts	links	rechts	links
		40117	40117	40117	40117	40117	40117

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The report printout from the integrated DIN-A4 printer is subdivided into three areas:

- Headers with customer and vehicle identification data --> here, the customer data entered before the start of measuring work are printed out together with the vehicle data.
- Centre section with vehicle data --> these include brand, type, model and model year of the vehicle, as defined during selection of the nominal data record. Furthermore, this section involves printing out the previously measured values for ride height, inflation pressure and tread depth.



- The final section with all chassis and suspension measuring values comprises 3 columns: incoming wheel alignment check, nominal values and outgoing measurement. The measured values are recorded separately in these 3 columns.

8. Special features

8.1 Wheel alignment with non-selective access

During wheel alignment checks with non-selective access, the selection and sequence of measuring points can be made in any desired order. When doing this, the following points must be observed in order to achieve the correct measuring results:

- Carry out all work as defined during the program-guided wheel alignment check.
- Before the alignment check of toe-in and camber values on the rear axle, the steering must be set in its 'straight-ahead' position to ensure that it is aligned with the vehicle's centre axis.
- Prior to the alignment check of individual toe-in values on the front axle, the steering wheel centre position needs to be determined to ensure that the steering wheel is in its correct position.

8.2 System settings

The following settings only need to be entered and set once: language, display format, date/time, promotional text, remote control with display, selection of rotary plate and printer setting. These remain saved in memory.

9. Comparison, BMW KDS (Bosch - Beissbarth)

	<u>Bosch</u>	<u>Beissbarth</u>
Recording of measuring values	Infrared	Image sensor
Data transmission	Cable	Infrared / cable
Voltage supply to the pickups	Cable	Accumulator / cable
Master key	Infrared	Infrared
Master key with measuring value display	Cable	Infrared
Nominal data memory	Disk	Hard disk
Measuring value memory	Always the last vehicle measured	unlimited vehicle memory capacity
Operating system	---	MS-DOS
Languages	English and one language on order	EN, DE, NI, SV, IT, FR, SP (other languages on request)
Update	3.5" diskette	3.5" diskette from TIS/DIS
Monitor	20"	17"
Computer	---	Pentium
Drives	2 x diskette	1 x diskette, 1 x CD-Rom

10 Change in operation (menu)

10.1 Master key with display

The process of enabling the master key with display is described in the following procedural steps:

1. in the special functions (button "**S**"), call up the "**Service**" menu
2. In the "**Service**" menu, call up the "**Master key**" submenu
3. In the "**Master key**" submenu, select the "**Master key with display**" point - this is a once-only setting.

Important!

On devices without master key, this setting must be set to "**No master key**".

10.2 Summary of operating instructions

1. Switch on the master key by pressing the "**ON**" button (it is permissible to switch this on during the alignment check). The title screen then appears on the LCD.



2. On the measuring equipment cabinet, select "**Straight-ahead driving**" for the "**Incoming alignment check**", then "**Adjusting procedure**" or the "**Outgoing alignment check**". The following graphic appears on the LCD monitor for "**Driving straight ahead**".
3. Pressing the "**Forwards arrow**" calls up the next measuring screen. What next appears on the LCD display blocks are a designation of the measured value and a tolerance bar with measured value. If that measured value is within tolerance, this is depicted with black numerals on a light background. If that measured value lies outside the tolerance, it is then displayed in inverted fashion (i.e. light numerals on a dark background).
4. Pressing the "**F**" button briefly makes it possible to alternate between the designation of the measured value and the nominal value with tolerance within the display block.
5. To scroll onwards through the measured values, press the "**Forward arrow**", "**Backward arrow**" and the "**Cancel**" keys (red spot). The function of this button is identical to that of the buttons/keys on the graphics pad.
6. Even when opting for the "**Alignment check with non-selective access**", the measured values can be chosen in the same way as for the "program-guided alignment check" process.
7. Using the "**Printer**" button enables reports to be printed out during the alignment check. The remote control buttons are only enabled during the measurement and setting process (not in response to customer input, choice of vehicle, etc.).

10.3 Display support

- Measured values with nominal/actual comparison and tolerance bar (nominal values can be displayed by pressing the "**F**" key/button)
- Touchscreen icon for touch-sensitive routines
- Summary of measured values with the latest nominal / actual comparison
- Compensation for lateral runout on wheel rims
- With all other functions (e.g. customer input), the title image appears on the liquid crystal display

Note:

Whenever data transfer from the master key / remote control to the computer is interrupted, the master key icon in the lower right-hand corner of the screen changes colour from green to red and the image on the LCD display is depicted in inverted format, i.e. black becomes white and vice versa. This changeover does not occur in the title image. Once visual connection is re-established, the master key recommences work at the point in the program where the interruption occurred. Continuous visual connection during the alignment check is therefore not necessary.

- The "**Egg timer**" icon on the LCD display indicates: "**Please wait**".
- The "**Battery**" icon in the upper right-hand corner of the LCD display indicates that the battery reserve has been reached.
- Switching off the remote control / master key: Press and hold down the "**F**" key for 5 seconds, then place in the charge bracket or plug in the charging cable. The title image then reappears as the charge indicator light.
- If the master key is placed in the charge bracket during the alignment check process, it must when required be switched on using the "**ON**" key.

11 Updating the software / nominal data

No more diskettes will be sent out to any BMW authorised workshops who in the past subscribed to "**BMW KDS** (Beissbarth / Bosch)". For reasons of cost, it is no longer possible to produce these diskettes in-house on the "**DIS tester**" or on the "**TIS/EPC server**". The data are updated on the TIS-CD on a regular basis

11.1 Prerequisites

- BMW KDS (Beissbarth / Bosch)
- Program status (Beissbarth) TIS-CD: from CD 12/95
- Program status EPC: from 12/95
- Program status (Bosch) TIS-CD: from CD 08/97
- Program status DIS: from V6.0
- Diskettes, 3.5", 1,44 MB (Beissbarth 5 diskettes / Bosch 1 diskette)

11.2 Procedure (Beissbarth)



1. Go into screen mask "**Administration**"
2. Select **KDS button**
3. Select **Beissbarth**
4. After request, load "**diskette 1**" and acknowledge with "**OK**" (program diskette 1 of 2 is created, perform labelling operation)
5. After request, load "**diskette 2**" and acknowledge with "**OK**" (program diskette 2 of 2 is created, perform labelling operation)
6. After request, load "**diskette 3**" and acknowledge with "**OK**" (program diskette 1 of 3 is created, perform labelling operation)
7. After request, load "**diskette 4**" and acknowledge with "**OK**" (program diskette 2 of 3 is created, perform labelling operation)
8. After request, load "**diskette 5**" and acknowledge with "**OK**" (program diskette 3 of 3 is created, perform labelling operation)
9. Perform software update and /or nominal data input on the KDS in the usual manner using the manufactured diskettes.

11.3 Procedure (Bosch)

1. Go into screen mask "**Administration**"
2. Select **KDS button**
3. Select **Bosch**
4. Write a name on "**Diskette 3.1**", when prompted to do so, insert in the drive and confirm by pressing "**OK**" (2x) --> nominal values are then copied to the diskettes
5. Load nominal value diskette 3.1 in drive 3.1, load operating system diskette 3.0 in drive 3.0.
6. Boot device in the usual manner

Important!

When producing KDS diskettes, all data on the diskettes used are overwritten.

Note:

Whenever an error occurs, this is displayed and the program aborts. This process needs to be restarted from the very beginning, which involves deleting all data from the diskette. Possibly use a new diskette.

12. Creating, copying and editing nominal data

12.1 Copying

- Press the "**C**" button and select the vehicle which is to be copied.
- In the special function section, select menu item "**Editing of nominal data**". Set up a new vehicle record in the familiar way. Now the data input screen displays the nominal values for the previously selected vehicle. Re-enter the modified data and save the data record.

12.2 Create

- Press the "**C**" button and, in the special function, select the "**Editing of nominal data**" menu item. Set up a new vehicle record in the familiar way. An empty data input screen now appears. Enter the data and save the data record.

12.3 Edit

- Nominal data programmed in the factory cannot be deleted or changed. If these data are changed, a new vehicle record with those amended nominal data needs to be set up. New vehicle records set up by the user are designated as such in the selection menu with a "+". These vehicles can be deleted by the user by means of the screen button "-" or can be amended using the "<>" button. These buttons only appear on the screen if the vehicles were entered in the system by the user.

13. Special functions

13.1 Customer button for printer protocol

In the "**Special function**" menu, the "**Customer-specific text**" submenu can be called up. An input screen appears on the display. A name and address must be added to this input screen and saved by pressing the "**S**" screen button. The text entered is then imprinted in the header of the protocol / report.

13.2 Alignment options



- in the special functions (button "**S**"), call up the "**Service**" menu
- In the submenu "**alignment**", select the "**Toe-in alignment**" or the "**Toe-in adjustment**" option. The toe-in and camber alignment program guides the user step by step through the alignment process with the help of text and images. At the end of the adjustment process, the deviation in measuring value from every measuring sensor is displayed on the screen.
- These alignment values can be saved in the measuring pickup memory by pressing "**Save**" or the program can be quit by pressing the "**Red button**" without saving (a checking function). The alignment values can be printed out.

13.3 Turntable test

- in the special functions (button "**S**"), call up the "**Service**" menu
- In the "**Service**" menu, call up the "**Turntable test**" function. Rotate left and right-hand turntables and check the display on the screen. Important: The measuring range is ± 306 degrees.

13.4 View and delete customer entries from the database

- In the special functions in the "**Database**" menu, call up the "**Delete**" menu option. The data input screen then appears. Fill in the search boxes with the data to be deleted.
- Using the "-" button, this data record can be deleted. It is now possible to use the touchscreen pen to highlight and delete a new data record.
- The screen buttons "**Arrow up**" and "**Arrow down**" enable users to scroll through the entire database.
- To quit the Delete function, press the Cancel button (red spot).

14. Internal program change

Other internal program changes were made which only slightly alter the program run, but which do optimise the alignment check in terms of comfort and speed. This is described in the following pages:

- Optimisation of compensation for lateral runout on wheel rims in relation to speed.
- Optimisation of impact routines: Marking can still be corrected within the gateway. The message "**Turntables not connected**" no longer causes this routine to terminate. Measuring can continue after the turntables have been plugged back in.
- Standardisation of screen colours with the colours on the panel.
- Extension of texts in some foreign languages.
- Elimination of program and cosmetic errors.
- Electronic water scales
- Discontinuation of wheelbase measurement

15. Faults

15.1 Tyre faults

<u>Error</u>	<u>Impact</u>
1 Tracking, camber, toe difference angle and caster not correct	1 Serious tyre squeak, even at relatively low speeds
2 Too much toe-in or too much positive camber	2 Tyres are worn longitudinally down one outside edge
3 Too much negative camber	3 Tyre wear on inner edge



- | | |
|---|--|
| 4 Worn front axle suspension points on FWD cars | 4 Amplified noise /

Vehicle pulls away one-sidedly when accelerating |
| 5 Incorrect toe adjustment | 5 Radial adjustment of wheel settings /

tyre tread exhibits burr formation within the tread pattern |
| 6 Play in wheel suspension caused by mechanical components (suspension, steering) | 6 Washed out areas /

wobbling on front wheel |
| 7 Insufficient inflation pressure in the tyre | 7 Tyre wear along outer areas |

15.2 Front axle fault

<u>Fault</u>	<u>Cause</u>	<u>Remedy</u>
1. Toe deviation	a) Vehicle not in normal position	a) Correct ride height
	b) Tie rod(s) bent	b) Replace tie rod(s)
	c) Ball joints on track rod(s) misaligned	c) Replace tie rod(s)
	d) Rubber mount in control arm faulty	d) Replace control arms
2. Camber deviation: Camber is defined by design and cannot be adjusted.	a) Rubber mount in control arm faulty	a) Replace control arms
	b) Control arm deformed	b) Replace control arms
	c) Spring strut deformed	c) Replace spring strut
	d) Guide joint worn	d) Replace control arms
	e) Spring deflection too great	e) Replace coil spring, ride height



	f) Front axle carrier deformed	f) Replacing front axle support
	g) Spring strut shock absorber mount misshapen	g) Repair front end
	h) Distortion in floor assembly (engine carrier)	h) Repair body
3. Castor deviation: Caster is defined by design and cannot be adjusted	a) Rubber mount for tension/traction strut defective	a) Replace rubber mount
	b) Tension/traction strut misshapen	b) Replace tension/traction strut,
	c) Control arm deformed	c) Replace control arms
	d) Spring strut deformed	d) Replace spring strut
	e) Wheel house deformed (spring-strut mount)	e) Repair front end
	f) Distortion in floor assembly (engine carrier)	f) Repair body
4. Toe angle difference deviation	Prerequisite: camber and caster are correct	
	a) Tie rods not adjusted uniformly	a) Adjust toe on left and right sides to same value
5. Wheel-offset deviation	Prerequisite: front wheels have equal single toe to geometrical axis	
	a) Front axle carrier deformed	a) Replacing front axle support
	b) Engine carrier deformed	b) Repair body
	c) Control arm deformed	c) Replace control arms



d) Tension/traction strut
misshapen

d) Replace tension/traction strut

15.3 Rear axle defects

<u>Fault</u>	<u>Cause</u>	<u>Remedy</u>
1. Camber deviation	a) Vehicle not in normal position, spring deflection too great	a) Correct ride height
	b) Rubber mount on rear axle carrier unserviceable	b) Replace rubber mount
	c) Rear axle carrier deformed	c) Check rear-axle carrier, replace if necessary
	d) Control arm deformed	d) Check/replace control arm
	e) Traction strut misshapen	e) Check traction strut, replace if necessary
	f) Distortion in floor assembly	f) Repair body
	g) Swinging arm deformed	g) Replace swinging arm
2. Rear-wheel position incorrect	a) Rear axle carrier displaced laterally	a) Check rubber mounts on rear- axle carrier, replace if necessary
	b) Distortion in floor assembly	b) Repair body
3. Toe deviation	a) Vehicle not in normal position, i.e. spring deflection too great	a) Correct ride height
	b) Rubber mounts in rear-axle carrier faulty	b) Replace rubber mount
	c) Control arm deformed	c) Replace control arms
	d) Rubber mount and swinging arm unserviceable	d) Replace swinging arm



e) Rear axle carrier deformed

e) Check rear-axle carrier,
replace if necessary

f) Traction strut misshapen

f) Check traction strut, replace if
necessary

Prerequisite: rear wheel total toe
value must be correct.

4. Deviation from the geometric
axis

a) Distortion in floor assembly

a) Repair body

Other notes on the topic of the "kinematics diagnosis system" can be found in the BMW KDS (Beissbarth / Bosch) operating instructions.

None of the function and system descriptions are covered by an update service. Availability of parts and scope for immediate ordering cannot be derived from this information. The specialist departments shall be in touch with the markets at an appropriate time with further details.



Run Flat Indicator

All models



Introduction

The Run Flat Indicator (RPA) monitors the tyre pressure throughout the journey.

The entire vehicle weight is carried by the tyre pressure in the tyres. If the tyre pressure in one of the tyres should drop, the tyre will gradually "cave in". The resulting flexing means that the faulty tyre will quickly receive additional damage during driving. The tyre could burst.

Some 80% of all punctures are caused by small holes (e.g. caused by nails). The holes result in a gradual loss of tyre pressure in the affected tyre. Many "tyre blowouts" can be traced back to preliminary damage caused by a gradual loss of tyre pressure.

A gradual loss of tyre pressure in one tyre may remain unnoticed for a long time. The lack of tyre pressure only makes itself clearly felt when driving when the tyre is almost completely depressurised.

As tyre pressure drops, the radius of the wheel and with it the tyre rolling circumference will also decrease. The upshot is that the wheel speed of the affected tyre is increased. The RPA records the wheel speeds using the wheel-speed sensors of the Dynamic Stability Control (DSC). The Run Flat Indicator compares the speeds of the individual wheels and computes an average speed. In this way the RPA is able to detect a loss of tyre pressure.

The RPA detects a drop in pressure below about $30\% \pm 10\%$ of the initial value. The RPA indicator and warning light indicates a drop in tyre pressure. The RPA will indicate this after just a short distance, as a rule after a few minutes, from a certain minimum speed (e.g. 25 km/h) up to the permissible top speed.

- > Different control units for the Run Flat Indicator [System overview ...]
- > E46 All-wheel drive [System overview ...]
- > E46, E53, E83, E85, E86 [System overview ...]
- > E60, E61, E63, E64 [System overview...]
- > E65, E66 [System overview...]
- > E70 [System overview ...]
- > E87, E90, E91, E92, E93 [System overview ...]



> R56 [System overview ...]

Despite coming from different manufacturers the systems hardly differ from one model series to the next in the way they appear to the driver (initialisation, Run Flat Indicator telltale and warning lamp, characteristics, diagnosis).

Caution! Responsibility resides with the driver at all times

Check tyre pressures regularly, at least twice a month and before embarking on lengthy journeys. During initialisation, the set tyre pressure is taken as the initial value for the current set of tyres.

If all 4 tyres lose tyre pressure at the same rate, the wheel speeds will also change at the same rate. The Run Flat Indicator is unable to detect a uniform drop in pressure in all tyres (e.g. due to diffusion = natural loss of air from all 4 tyres)

Caution! Correct function of the Run Flat Indicator is not guaranteed when the compact spare wheel is fitted.

As the compact spare wheel has a much smaller diameter, the correct operation of the Run Flat Indicator can no longer be guaranteed.

Brief component description

The SMG system comprises the following key components:

- **4 wheel speed sensors**

The wheel speed sensors of the Dynamic Stability Control (DSC) measure the wheel speeds of the individual wheels.

- **Run Flat Indicator button**

> E46, E53, E83, E85, E86

The Run Flat Indicator button is only needed for initialising the RPA. (Run Flat Indicator initialisation means "teaching the system the tyre pressures").

- **CID: Central information display**

Vehicles that are equipped with CID are initialised using the CID.

- **On-board computer button and rocker button on the turn signal/high beam switch**

> E87, E90, E91, E92, E93, R56

Initialisation is performed on the liquid crystal display, using the on-board computer button and the rocker switch on the turn signal/high beam switch. The on-board computer functions are selected with the rocker switch.

The R56 does not have a rocker switch. The on-board computer functions are selected with the on-board computer button.

The Run Flat Indicator software is in the following control units, depending on model series:

- **Run Flat Indicator control unit**

E46 all-wheel drive vehicles

The E46 all-wheel drive vehicle has a separate Run Flat Indicator control unit. The 4 wheel speed sensors measure the wheel speeds. The DSC control unit sends the signals through 4 direct lines to the Run Flat Indicator control unit.

or

- **DSC control unit with additional software for flat tyre monitor**

> R56

The ABS control unit is standard equipment on the R56. Run Flat Indicator is integrated into the DSC control unit by means of additional software.

or

- **DSC control unit with additional software for flat tyre monitor**

> R56

ASC+T is optional equipment on the R56 (ASC+T: Automatic Stability Control + Traction (ASC+T)). Run



Flat Indicator is integrated into the ASC+T control unit by means of additional software.

or

- **DSC control unit with additional software for flat tyre monitor**

> E46, E53, E60, E61, E63, E64, E70, E83, E85, E86, E87, E90, E91, E92, E93

> R56: Optional equipment

With the DSC Mk60 and the DSC 8, the Run Flat Indicator is integrated into the DSC control unit using additional software (the E70 is equipped with DSC 8 Premium).

or

- **CIM: Chassis integration module**

> E65, E66

The CIM controls:

- Servotronic
- Steering column adjustment
- Run Flat Indicator (RPA)

The following control units are involved in the Run Flat Indicator system (in alphabetical order):

- **CAS: Car Access System**

> E60, E61, E63, E64, E65, E66, E70, E87, E90, E91, E92, E93, R56

The CAS control unit provides input signals relating to terminal status (e.g. terminal 15 ON).

- **GM: Basic module**

> E46, E53, E83, E85, E86

The basic module provides input signals relating to terminal status (e.g. terminal 15 ON).

- **JBE: Junction Box Electronics**

> E70, E87, E90, E91, E92, E93, R56

The JBE is the data interface (= gateway) between the K-CAN and the PT-CAN. (K-CAN stands for "Body Controller Area Network"; PT-CAN stands for "Powertrain Controller Area Network")

The junction box consists of the junction box electronics and the power distribution box.

- **KGM: Body gateway module**

> E60, E61, E63, E64 from 09/2005

The body gateway module (KGM) replaces the safety and gateway module (SGM).

The KGM forms the data interface (= gateway) between the K-CAN and the PT-CAN.

- **M-ASK or CHAMP or CCC: Multi-audio system controller or multimedia platform or Car Communication Computer**

M-ASK or CCC or CHAMP (multimedia platform: CHAMP; Central Head Unit and Multimedia Platform) issues an acoustic warning through the speakers if the tyre pressure should drop.

(On vehicles without M-ASK or CCC or CHAMP, the instrument panel will emit the warning.)

- **SGM: Safety and gateway module**

> E60, E61, E63, E64 up to 09/2005

> E65, E66 from 03/2004

The SGM is the data interface (= gateway) between the K-CAN, **byteflight** and the PT-CAN.

- **SZL: Steering column switch cluster**

> E87, E90, E91, E92, E93, R56

The signals from the on-board computer button and from the rocker switch are recorded and processed in the SZL. The data is transmitted to the instrument panel (on-board computer).

- **ZGM: Central gateway module**



> E65, E66 up to 03/2004

The ZGM forms the data interface (= gateway) between the K-CAN and the PT-CAN.

- **KOMBI and CID: Instrument panel and Central Information Display**

A fault in the Run Flat Indicator or drop in tyre pressure will be indicated by the Run Flat Indicator telltale and warning lamp in instrument panel.

At the same time, the symbol will light up in the liquid crystal display.

Fault statuses registered by the Run Flat Indicator are indicated as follows by the Run Flat Indicator telltale and warning lamp (for deviations, please refer to national-market version):

- The Run Flat Indicator telltale and warning lamp lights up:
 - **Red** (with acoustic signal):
The tyre pressure loss is more than approx. 30 % ± 10 %. Driving safety is no longer guaranteed.
 - **Yellow:**
Run Flat Indicator failed

Information about the check control message can be called up in the CID (CID is fitted depending on the vehicle equipment).

[more ...]

System functions

The Run Flat Indicator (RPA) comprises the following functions:

- Self-test
- Initialisation
- Detects drop in tyre pressure
- Visual and acoustic warning
- Actively relieve faulty wheel (only E70)

Self-test

The Run Flat Indicator performs a self-test when terminal 15 is switched ON. A fault in the Run Flat Indicator is indicated by the Run Flat Indicator telltale and warning lamp and by a symbol in the liquid crystal display.



Initialisation

Initialisation is started manually (e.g. by pressing the Run Flat Indicator button). Once it has been started, initialisation will continue through to complete calibration. This process may be interrupted any number of times.

It is important that the vehicle is driven away immediately after initialisation is started. The system will not start calibration until the vehicle is driven away. Even a terminal change will not change this.

In principle, calibration is only possible while the vehicle is being driven (driving speeds above 25 km/h).

Initialisation will run as a fully automatic calibration sequence (after the journey has started),. In other words, the circumference of individual tyres are recorded and evaluated.

To allow a drop in tyre pressure to be detected, the system considers different speed ranges and driving situations. Taking account of the driving situation means that the system has to be primed for each speed range individually.

From 09/2004 (starting with E87), these speed ranges and driving situations have been combined into 3 calibration ranges. This means greater clarity for output via the BMW diagnosis systems Group Tester One (GT1) and DISplus.

The initialisation phase lasts approx. 5 to 15 minutes for the individual speed ranges. The end of the initialisation phase is not indicated.

A visual and acoustic warning can only be emitted in the speed ranges that have been calibrated by at least 67 percent.

The calibration process can be delayed by:

- dynamic driving style
- a road with lots of bends
- frequent changes in load (only on vehicles with self-levelling suspension -> control of the air springs/self-levelling suspension)

Detects drop in tyre pressure

The Run Flat Indicator records the wheel speeds using the wheel speed sensors from the DSC. The Run Flat Indicator compares the speeds of the individual wheels and computes an average speed. In this way the RPA is able to detect a loss of tyre pressure. (In the event of a tyre losing pressure, the tyre rolling circumference of the affected tyre is also reduced.)

Visual and acoustic warning

A drop in tyre pressure in one tyre of approx. 30 % \pm 10 % from the initial value is indicated by the Run Flat Indicator telltale and warning lamp. In addition, an acoustic signal sounds.

Signal output: Depending on the model concerned, either via the instrument panel or the multi-audio system controller (M-ASK) / Car Communication Computer (CCC).

Note: DSC fault

The sensors used by the Run Flat Indicator are all monitored by the DSC. If DSC detects a fault, the Run Flat Indicator will also register a fault.

Actively reducing load on faulty wheel

> E70

If the Run Flat Indicator detects a puncture on one of the wheels on the rear axle, the self-levelling suspension will actively reduce the load on the wheel concerned. The body may then assume a slight incline. As soon as the puncture has been repaired and the Run Flat Indicator reinitialised, the incline will be levelled out again. No repair work is needed on the air suspension itself.

Special conditions for system function

The following **driving conditions** may cause a **delay in the warning** being given in the event of a drop in tyre pressure:

- Heavy braking



- Rapid acceleration
- High rate of lateral acceleration
- Cornering (in a tight corner)
- Vehicle speed dropping below a minimum speed (the Run Flat Indicator only responds when a certain minimum speed has been reached)
- Large difference in slip (between axles or between wheel on one side of vehicle)
- Initialisation not being completed in current speed range (see "Controls")
- Winter conditions
- Heavy changes in load (only vehicles with self-levelling suspension)

The following **operating conditions** may cause a **delay in the warning** being given in the event of a drop in tyre pressure:

- Driving with snow chains fitted

Driving with snow chains may impair the correct function of the Run Flat Indicator.

The system will work as normal again after the snow chains have been removed and the vehicle is driven for a few minutes. (Repeat initialisation not necessary.)

Note: Do not perform initialisation when snowchains are fitted.

Initialisation and snow chains will cause incorrect adaptation values.

- Trailer towing

Initialisation is required for trailer loads exceeding approx. 300 kg. Perform initialisation again after attaching or removing the trailer.

- Old/new tyres

Note: Only fit tyres with the same tread depth!

Avoid fitting tyres with greatly different tread depth (from approx. 2 millimetres) on one axle. The different diameters mean that the correct operation of the Run Flat Indicator is no longer guaranteed.

The following situations may cause **unnecessary warnings**:

- Initialisation not completed after a tyre has been replaced (old/new tyres, summer/winter tyres, change in direction of rotation, or replacement of single faulty tyre) tyre pressures have been changed
- Tyres have different levels of wear
- Frequent changes in load (only on vehicles with self-levelling suspension)
- Tyres that have not been approved by BMW
- Damaged tyres, even if no loss of tyre pressure can be detected (e.g. radial runout)
- Tyre has changed slightly during the running-in phase (settling)

In the following cases, the system will **not emit a warning despite a drop in tyre pressure being detected**:

- The same amount of pressure is lost in 2 or more tyres.
- Drops in tyre pressures caused by diffusion and affecting all 4 tyres equally
- If a tyre is damaged with a sudden loss of all pressure (tyre blowout, warning is given too late)

Operation

The Run Flat Indicator (RPA) is initialised using the following operating elements:

- Run Flat Indicator button
- On-board computer button on turn signal/high beam switch
- With control centre in the Central Information Display (CID) with the controller

Caution! Always perform initialisation immediately after correcting the tyre pressure, especially if a wheel is changed or the wheels are interchanged. Only check tyre pressures when the tyres are cold.

Set the tyres to the correct pressure before performing initialisation. During initialisation, the set tyre pressure is taken as the initial value for the current set of wheels.

Correct the tyre pressures when the tyres are cold to prevent the data recorded from being affected by temperature.

Caution! Responsibility resides with the driver at all times



Check tyre pressures regularly, at least twice a month and before embarking on lengthy journeys. During initialisation, the set tyre pressure is taken as the initial value for the current set of tyres.

Initialise the Run Flat Indicator in the following situations:

- If tyre pressure is changed
(tyre pressure is corrected or reset)
- If the position of the tyres is changed (change of axles, wheels), even if the tyre pressure is not changed
- If a tyre is changed or the wheels are interchanged
(e.g. old tyres for new tyres, summer tyres for winter tyres, etc.)

Start initialisation as follows:

- Terminal 15 ON
(engine OFF or ON, do not pull away)
- Vehicles **with** Run Flat Indicator button
 - Press and hold the Run Flat Indicator button until the Run Flat Indicator telltale and warning lamp lights up yellow for a few seconds
- Vehicles **with** on-board computer button (on-board computer function)
 - In the on-board computer function select "RPA" and "INIT" (liquid crystal display) with the rocker switch on the turn signal/high beam switch. Press the on-board computer button to confirm.
 - Press and hold the on-board computer button for approx. 5 seconds, until a box with a tick appears behind the "INIT" display.

> R56:

- In the on-board computer function select "SET/INFO" (liquid crystal display in auxiliary instrument) with the on-board computer button on the turn signal/high beam switch.
- Press and hold the on-board computer button until the display changes
- Press the on-board computer button repeatedly until the corresponding symbol and the word "RESET" are displayed.
- Press and hold the on-board computer button until a square with a tick appears.
- Vehicles with Central Information Display
Initialisation is performed via the Central Information Display (CID) and controller.
 - Select "RPA" in the "Settings" menu and confirm.
 - Select "Set" and confirm.
- Drive off

The end of the initialisation phase is not indicated.

Switch-on conditions

The Run Flat Indicator (RPA) is automatically activated when terminal 15 is switched ON. The Run Flat Indicator cannot be switched off manually.

Notes for Service department

Observe the following information for service:

- General information: [more ...]
- Diagnosis: ---
- Encoding/programming: [more ...]

National-market version for US

A puncture is indicated as follows:

> E53, E83, E85, E86

Yellow Run Flat Indicator telltale and warning lamp **without** acoustic signal

> E60, E61, E63, E64, E65, E66, E70, E90, E91, E92, E93, R56

Yellow Run Flat Indicator telltale and warning lamp **with** acoustic signal

An RPA failure is indicated as follows:



- Yellow Run Flat Indicator telltale and warning lamp **without** acoustic signal

Subject to change.



Interior mirror with digital compass



T5105001

Introduction

A digital compass is offered as optional equipment (SA 4NA) in the inside mirror.

> up to 09/2006

A small liquid crystal display at the top right in the inside mirror displays in which direction of travel the vehicle is pointing: e.g. **SW** for South West.

> from 09/2006

The display is realised with transparent light technology. An liquid crystal display (window) is no longer needed. The display can be deactivated.

The compass offers an additional benefit especially in the USA. In large cities the streets are frequently arranged according to the points of the compass. The signposts are also specified with points of the compass. However, the compass also assists orientation in large European cities on the basis of the points of the compass. [System overview ...]

> E88, E93 from 09/2008

The digital compass must be calibrated once with the soft top or hardtop closed and once with the soft top or hardtop open. The position of the soft top or retractable hardtop has an effect on the magnetic field in the vehicle. A deflected magnetic field will lead to calibration errors.

Brief component description

The following components deliver signals for the digital compass:

- **Magnetic field sensor**

> up to 09/2006

The magnetic field sensor is installed in the mirror base. The magnetic field sensor measures the current alignment of the magnetic field. The signal is sent to the control electronics for the compass in the inside mirror.

> from 09/2006

The magnetic field sensor is on the PCB in the inside mirror.

[more ...]



- **Control electronics for the compass**

The inside mirror is electrically connected to the roof function centre (FZD).

The control electronics for the compass are integrated into the printed circuit board for the inside mirror. The signals from the magnetic field sensor are received by the control electronics. The liquid crystal display is activated directly by the control electronics.

The following components are controlled:

- **Display in inside mirror**

> up to 09/2006

The liquid crystal display (window) is situated at top right in the inside mirror.

The points of the compass are presented digitally on the liquid crystal display (LCD: Liquid Crystal Display). The display is divided into eight compass points.

> from 09/2006

The point of the compass is displayed in transparent light technology in the inside mirror as well. The display is also at the top right in the inside mirror. The display is divided into eight compass points.

System functions

The following system functions for the digital compass are described:

- Display
- Brightness control of display
- Adjustment of magnetic field zones and calibration
- from 09/2006: Further adjustments
- up to 09/2006: Fault display

Display

The 8 points of the compass are digitally displayed by abbreviations.

> from 09/2006

The display is available in English and German (delivery status: English LHD)

N:	North
NE:	North East (German: NO)
E:	East (German: O)
SE:	South East (German: SO)
S:	South
SW:	South West
W:	West
NW:	North West

The changeover between displays is carried out as follows:

- The current vehicle position is the centre of a 360° circle.
- The eight points of the compass divide these 360 into sixteen 22.5 segments.
- The display changes over if the direction of travel changes by more than 22.5°.



Brightness control of display

2 photosensors in the electrochromic inside mirror record the ambient brightness (1 photosensor for the ambient brightness coming from the front, 1 photosensor for the ambient brightness coming from the rear).

The photosensors deliver the signals for the display brightness control.

The brightness of the display is adjusted by the inside mirror control electronics to suit the ambient brightness.

> E88, E93

A darkened inside mirror will become lighter while the soft top or the retractable hardtop is opening and closing.

The roof function centre (FZD) transmits the signal (roof open or closed) to the control electronics for the inside mirror. The signal is transmitted on the line that is also used for transmitting the signal for driving in reverse.

Adjustment of magnetic field zones and calibration

The worldwide magnetic field zones are permanently stored in the inside mirror. The magnetic field zones represent the deviations in relation to an ideal magnetic field for earth. The orientation "North" is precisely determined by the magnetic field zones.

The current magnetic field zone may be adjusted according to the geographic location. For example, Germany is located in magnetic field zone "8".

A vehicle has its own magnetic field. This makes it possible for the magnetic field sensor to measure an overlapping of the magnetic field with the Earth's magnetic field. This overlapping is "worked out" by calibrating the compass.

A changed magnetic field is normally calibrated "automatically".

The vehicle's magnetic field may change under the following special circumstances:

- Powerful vibration during an accident
- Very large external magnetic field - e.g. if a vehicle passes under a train when travelling through an underpass

However, a manual calibration may speed up the automatic calibration.

For procedure to be followed when setting the magnetic field zones as well as manual calibration: see notes for service staff.

From 09/2006: Further adjustments

Different time-based adjustment menus can be obtained by means of the control button:

- 0 to 3 seconds: Display ON/OFF
- 3 to 6 seconds: Adjustment of the magnetic field zones (0 -15)
- 6 to 9 seconds: Calibration (C)
- 9 to 12 seconds: Left-hand drive or right-hand drive (L or R)
- 12 to 15 seconds: English or German (E or O)

Release the control button when the correct menu is obtained. Select values in the menu by pressing briefly. After approx. 5 seconds the value is stored and the menu is automatically exited.

up to 09/2006: Fault display

The LC matrix for the liquid crystal display lights up completely if a system fault develops. A fault is displayed under the following conditions:

- If the vehicle is highly magnetised (2200-2500 milligauss), the measuring range of the magnetic field sensor will be exceeded.
- If a fault develops in the circuitry of the magnetic field sensor.



Note: Physical unit Gauss!

Gauss is the unit of measurement for magnetic flux density.

Switch-on conditions

At terminal 15 ON, the display is activated with a test run.

> up to 09/2006

The LC matrix lights up completely (approx. 3 seconds). The digital compass is then switched on. There is no switch to deactivate the liquid crystal display if terminal 15 is ON.

Notes for Service department

The following information is available for service staff:

- General information: [more ...]
- Diagnosis: ---
- Encoding/programming: ---

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Interior mirror with digital compass



T5105001

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However, a manual calibration may speed up the automatic calibration.

For procedure to be followed when setting the magnetic field zones as well as manual calibration: see notes for service staff.

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- If a fault develops in the circuitry of the magnetic field sensor.



Note: Physical unit Gauss!

Gauss is the unit of measurement for magnetic flux density.

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At terminal 15 ON, the display is activated with a test run.

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Notes for Service department

The following information is available for service staff:

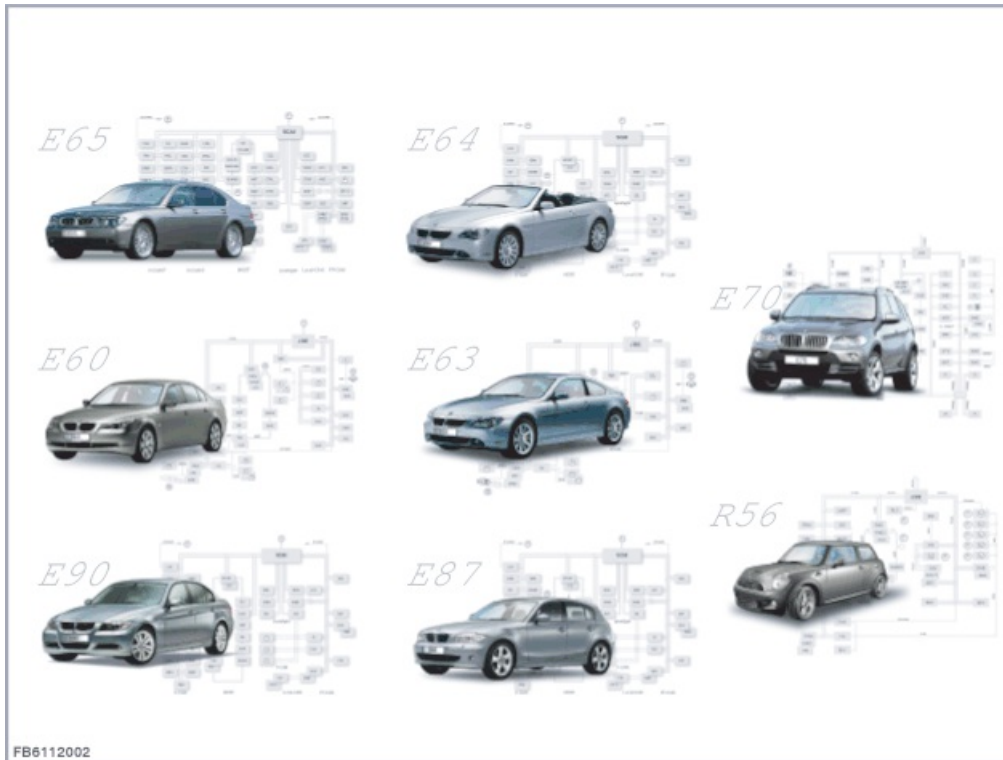
- General information: [more ...]
- Diagnosis: ---
- Encoding/programming: ---

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Bus diagnosis

All models from E60



Introduction

In the vehicles of today, components and control units are networked by means of data buses. Data buses are capable of transmitting messages with signals. The connected control units only read off those messages and signals that are of relevance to their operation.

Most buses are CAN data buses (CAN: Controller Area Network). There are several CAN buses with different data transfer rates in each vehicle. For example, the PT-CAN has a fast data transfer rate, the K-CAN a slower data transfer rate. A fibre-optic cable is used for navigation and entertainment: the MOST bus (MOST = "Media Oriented System Transport"). There is a separate data line for diagnosis: the diagnostic cable, also called the "K Line". [For further information, please refer to BMW Service Technology (SBT) 61 03 05 144]

The following options are available for locating faults in data buses and in control units:

- **Test module for diagnosing CAN buses in the diagnostic system: MOST system analysis**

The procedure for opening the diagnostic module in the ISTA (Integrated Service Technical Application) diagnosis system is as follows:

Activities > Function structure > 03 Body > System analyses > CAN functions > System analysis

The test module is automatically entered in the test schedule if at least one message error (message missing) has been recorded.

- **Checking the terminating resistors:**

Checking the terminating resistors can also be important for bus diagnosis.

- **Procedure for diagnosis on the MOST buses: MOST system analysis**

The procedure for opening the test module in the ISTA diagnosis system is as follows:

Activities > Function structure > 03 Body > Audio, video, telephone, navigation (MOST ring) > MOST functions > MOST system analysis.

These two procedures and the installation points of the terminating resistors are described in detail below.

Bus system analysis

The bus system analysis narrows down the cause of **intermittently** occurring faults in the area of the data buses and control units.



Note: Diagnosis of intermittent faults and permanent faults

All cases where a data bus or control unit only fails **temporarily** (i.e. intermittently) are difficult for diagnosis. In such cases, the entries in the control units' fault memories do not point unambiguously to an intermittent failure of a particular data bus or control unit.

Intermittent failure of a particular data bus or control unit causes many different fault memory entries in several control units. The system analysis routine processes all of these DTC fault code entries (message missing) for all control units. In this process it employs a probability calculation to localise the fault cause within a specific sector.

If a data bus fails **completely** and **permanently**, the affected control units are no longer available for diagnosis. The fault is thus easy to locate.

Terminating resistors

The installation locations are listed below for the purposes of measuring the terminating resistor values.

> R5x and R6x

- **F-CAN**

- Vehicles with Dynamic Stability Control (DSC)
 - 1 resistor is in the DSC control unit
 - 1 resistor is in the DSC sensor (under the front passenger seat)

- **PT-CAN**

- 1 resistor is in the SZL control unit in the version with steering angle sensor (SZL: steering column switch cluster)
- 1 resistor is in the EPS control unit (EPS: electro-mechanical power steering)

> E60, E61, E63, E64

- **F-CAN**

- Vehicles **with AS** (Active Steering)
 - 1 resistor is in the cumulative steering-angle sensor in the steering box.
 - 1 resistor is in the DSC sensor (under the front passenger seat).
- Vehicles **without AS** (Active Steering)
 - 1 resistor is in the DSC control unit (DSC: Dynamic Stability Control)
 - Dynamic Stability Control 1 resistor is in DSC sensor 2 (under the front-passenger seat; DSC sensor 1 is under the driver's seat).

- **PT-CAN**

- 1 resistor is in the DSC control unit (DSC: Dynamic Stability Control).
- 1 resistor is in the SGM control unit (safety and gateway module)
- From 09/2005, this resistor is in the KGM control unit (body-gateway module)

> E65, E66

- **PT-CAN**

- 1 resistor is in the front wiring harness at the right spring strut dome. This resistor can be disconnected from the PT CAN.
- 1 resistor is in the wiring harness under the back seat.
- This resistor cannot be disconnected.



> E7x

- **F-CAN**

- 1 resistor is in the SZL control unit (SZL: steering column switch cluster)
- 1 resistor is in the DSC control unit (DSC: Dynamic Stability Control)

- **FlexRay**

If the vehicle is equipped with option SA2VA "Adaptive Drive", the 4 damper satellites are connected to the VDM control unit via the FlexRay data bus.

This option (special equipment) comprises 2 systems: Vertical dynamics management (VDM) and active roll stabilisation (ARS: sales designation "Dynamic Drive").

A damper satellite is fitted to each shock absorber.

- Vehicles with "Adaptive Drive"
 - 1 resistor in each damper satellite of the vertical dynamic management system (VDM)

- **PT-CAN**

- 1 resistor is in the DSC control unit (DSC: Dynamic Stability Control)
- 1 resistor is in the EMF control unit (EMF: Electromechanical parking brake)

> E8x and E9x

- **F-CAN**

Different terminating resistors are used depending on the motorisation:

- Vehicles with engine N4... (basic version and high equipment)
 - 1 resistor is in the SZL control unit (SZL: steering column switch cluster)
- Vehicles with engine M47, M57, N5... (basic version and high equipment)
 - 1 resistor is in the DSC control unit (DSC: Dynamic Stability Control)
 - 1 resistor is in the SZL control unit (SZL: steering column switch cluster)

- **PT-CAN**

Different terminating resistors are used depending on the motorisation:

- Vehicles with engine N4... (basic version and high equipment)
 - 1 resistor is in the DSC control unit (DSC: Dynamic Stability Control)
 - 1 resistor is in the JBE control unit (JBE: junction box electronics)
- Vehicles with engine M47, M57, N5... (basic version and high equipment)
 - 1 resistor is in the DSC control unit (DSC: Dynamic Stability Control)
 - 1 resistor is in the EKP control unit (EKP: controlled fuel pump)

MOST system analysis

The MOST bus has a ring structure. This means that a fault in **one** control unit can have an effect on the entire system. The cause of a system fault (= communication fault) in the MOST network is not readily apparent.

The "MOST system analysis" test module (diagnostic system starting with DIS CD 36) and is now being consistently improved in order to analyse communications errors in the MOST control units.

In order to determine the cause of a system fault in the MOST network, the following prerequisites have been established:

- If a communication fault occurs in MOST control units, then this communication fault is not shown in the fault memory of the control unit concerned.
- The brief test for the "MOST system analysis" "virtual" control unit reads the communication faults of all the MOST control units.

Functions of MOST system analysis

The "MOST system analysis" test module follows the following sequence:



1. Read fault code memories of MPM, KGM, PM or JBE

- It first checks whether the communication with the following control units is in order:
 - > R5x and R6xJBE: Junction Box Electronics
 - > E60, E61, E63, E64 up to 09/2005
MPM: Micro-power module
 - > E60, E61, E63, E64 starting from 09/2005
BGM: Body gateway module
 - > E65, E66:
PM: Power module
 - > E7x
JBE: Junction Box Electronics
 - > E8x and E9x
JBE: Junction Box Electronics

- Then the fault memories are read.

The following fault code memory entries are read:

- > R5x and R6x
JBE: Junction Box Electronics
Have the auxiliary consumer units been switched off?
- > E60, E61, E63, E64 up to 09/2005
MPM: Micro-power module
Have the auxiliary consumer units been switched off?
- > E60, E61, E63, E64 starting from 09/2005
BGM: Body gateway module
Have the auxiliary consumer units been switched off?
- > E65, E66:
PM: Power module
Is there a break in the connection from the control units to the battery?
Is the battery fully discharged?
- > E7x
JBE: Junction Box Electronics
Have the auxiliary consumer units been switched off?
- > E8x and E9x
JBE: Junction Box Electronics
Have the auxiliary consumer units been switched off?



2. check communication with CD or CCC or CHAMP or M-ASK or RAD2

- A check is performed as to whether the communication with the following control units is OK:
 - > R5x and R6x
CCC or RAD2 Car Communication Computer or Radio 2 (Radio Boost)
 - > E65, E66:
CD: Control display
 - > E60, E61, E63, E64
CCC or M-ASK or CHAMP: Car Communication Computer or multi-audio system controller or Central Head unit And Multimedia Platform
 - > E7x
CCC or M-ASK or CHAMP: Car Communication Computer or multi-audio system controller or Central Head unit And Multimedia Platform
 - > E8x and E9x
RAD2: Radio 2 (BMW Professional radio)
- If there is a problem with the communication, the appropriate fault is displayed. End of testing procedure.
- If communication with headunit is OK, go on to Step 3.
(Headunit: In the field of automobiles, the headset is the user interface for systems that are not essential for driving, for example navigation, mobile telephone or radio. Headset is a collective term for various control units, for example CCC, CHAMP, M-ASK, e.g in MOST system analysis).

3. Check MOST ring

Is the MOST-ring closed?

The ring break diagnosis is performed.

4. Check MOST configuration

- This step checks whether the fault "MOST-Ring: desired/actual configuration do not coincide" is stored. Depending on the model series concerned, the fault is stored in the following control units:
 - > R5x and R6x
CCC: Car Communication Computer
RAD2: Radio 2 (Radio Boost)
 - > E60, E61, E63, E64
CCC or M-ASK or CHAMP: Car Communication Computer or multi-audio system controller or Central Head unit And Multimedia Platform
 - > E7x
CCC or M-ASK or CHAMP: Car Communication Computer or multi-audio system controller or Central Head unit And Multimedia Platform
 - > E8x and R9x
CCC or M-ASK: car communication computer or multi-audio system controller
RAD2: Radio 2 (BMW Professional radio)
- The test compares the desired configuration of the MOST bus with the actual configuration.
If the actual configuration differs from the desired configuration then the desired configuration for the control units is stored again in the MOST network.
If the desired configuration is stored, continue with the 5th step.



5. Analyse fault memory of the MOST control units

The fault memory entries in all MOST control units are evaluated with regard to communication faults. The evaluation of the existing fault code memory entries provides the most probable fault cause. At most the 2 most probable causes of the fault (control units) will be given as a result, e.g.:

- CDC CD changer (* * * *)
- TEL Telephone (**)

Evaluation of the quality of the results:

(****) stands for high quality (most probable fault)

(*) stands for poor quality

The number of asterisks varies between one asterisk and five asterisks.

The necessary procedure is described.

Notes for Service department

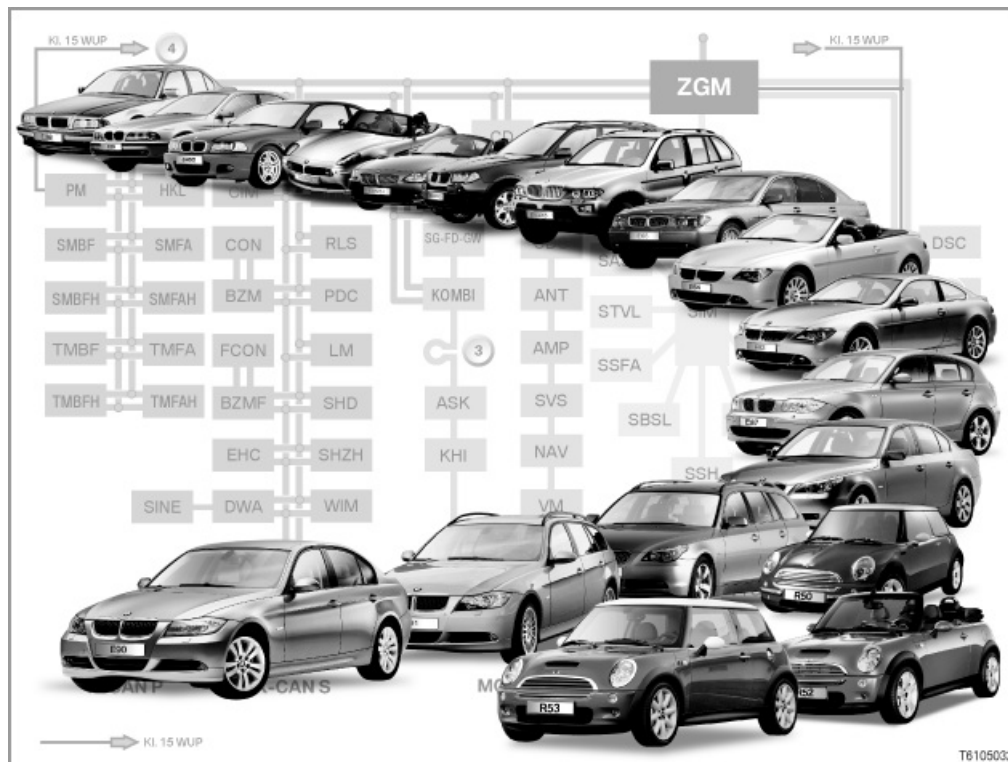
- General information:
- Diagnosis: ---
- Encoding/programming: ---

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Bus structures

All models from E38 and MINI



Introduction

In the vehicles of today, components and control units are networked by means of data buses. Data buses are capable of transmitting messages and signals. The connected control units only read off those messages and signals that are of relevance to their operation.

Most buses are CAN buses (CAN: Controller Area Network).

A fibre-optic cable is used for navigation and entertainment: The MOST bus (MOST = "Media Oriented System Transport").

It has its own data wire for diagnosis: the diagnostics cable, also known as the "K-line"

[Overview of BMW data buses ...]

This SI Technology bulletin (SBT) contains system overviews of bus structures for the following model series:

- E38 [system overview ...] (7-Series, manufacturing period from 1994 to 2001)
- E39 [system overview ...] (5-Series, manufacturing period from 1995 to 2003)
- E46 [system overview ...] (3-Series, manufacturing period from 1997 to 2005)
- E52 [system overview ...] (Z8, manufacturing period from 1999 to 2003)
- E53 [system overview ...] (X5, manufacturing period from 1999 until 2006)
- E60, E61, E63, E64
 - > E60, E61, E63, E64 from 03/2007: [System overview ...]
 - > E60, E61, E63, E64 from 09/2005 until 03/2007: [system overview ...]
 - > E60, E61, E63, E64 from 03/2005 until 09/2005: [system overview ...]
 - > E60, E61, E63, E64 until 03/2005: [system overview ...]
- E65, E66
 - > E65 and E66 from 03/2005: [system overview ...]
 - > E65 and E66 from 03/2004 until 03/2005: [system overview ...]
 - > E65 and E66 until 03/2004: [system overview ...]



- E70 [system overview ...] (X5, start of series production 2006)
- E83
 - > E83 [system overview ...] (X3, start of series production 2004 until 09/2006)
 - > E83 from 09/2006 [system overview ...]
- E85, E86
 - > E85 (Z4), start of series production 2002 until 01/2006: [system overview ...]
 - > E85, E86 from 01/2006: [system overview ...]
- E81, E82, E87 [system overview ...] (1-Series, start of series production 2004)
- E90, E91, E92, E93 [system overview ...] (3-Series, start of series production 2005)
- R50, R52, R53 [system overview ...] (MINI and MINI Convertible, start of series production 2001)
- R55, R56 [system overview ...] (start of series production 2006)

This SI Technology bulletin (SBT) also contains a section with frequently asked questions.
[more ...]

Note: Abbreviations for control unit names

In the overviews of bus structures, all diagnosis and programming control units are indicated by abbreviations.

The abbreviations used for the control units are listed in alphabetical order and explained in the SI technology bulleting "abbreviations."

[more ...] and

[for more information, please refer to SI Technology (SBT) 00 01 03 035]

The following control units are numbered:

- Control units that **cannot** be programmed and **cannot** be encoded and which **do not** appear in the quick test.

These control units do not have an abbreviation, just a number.

- Control units with control unit designation from the time before electrical system 2000:

Besides the abbreviation, these control units have a number for entering in the table.

On the history of control unit designations:

Since the start of series production of the E65 (electrical system 2000), the control unit designations have been harmonised. Earlier model series have varying control unit designations.

For technical reasons associated with the system, these control units have not been renamed.

This is because: These control unit designations appear in the quick test on the BMW diagnosis system.

Buses and control units in the E60, E61, E63, E64

In the E60, the K-CAN S and K-CAN P from the E65, E66 have been combined to form the K-CAN.

This means the E60 has the following buses: **byteflight** (until 09/2005), K-CAN, MOST, F-CAN, PT-CAN plus a local CAN (for the engine management system).

The central interface for exchanging data between buses is the safety and gateway module (SGM).

Note: Modifications in the bus structures on the E60, E61, E63, E64 from 03/2007

From March 2007, the bus structures are modified as follows:

- The D-CAN is now also integrated:

D-CAN (diagnosis-on CAN) supersedes the previous diagnosis interface in all parts of the world.

- The GWS is now also integrated:

A new control unit has been integrated on the PT-CAN for selecting the drive position in the automatic transmission.

GWS: Gear selector switch



With the gear selector switch, the automatic transmission is no longer actuated mechanically, but rather electronically.

- The TLC is now also integrated:

A new control unit has been integrated on the PT-CAN for the driver assistance system.

TLC: Track lane control

Track lane control supports the driver by vibrating the steering wheel to warn him if the vehicle unexpectedly drifts off of the regular course, prompting him to countersteer.

- The LDM and LRR are also integrated:

With the introduction of active cruise control with stop&go function, 2 new control unit are integrated for cruise control:

LDM: Longitudinal dynamics management

LRR: Long range sensor

The control unit for longitudinal dynamics management (LDM control unit) is connected to the PT-CAN.

The long range sensor is connected to the LDM and the close-range sensors by the new sub-bus. The sub-bus is called the sensor CAN (S-CAN).

> E60, E61, E63, E64 from 03/2007: Buses and control units: [System overview ...]

Note: Modifications in the bus structures on the E60, E61, E63, E64 from 09/2005

From September 2005, the bus structures are modified as follows:

- No **byteflight** data bus

The SZL control unit is connected to the PT-CAN and no longer to the **byteflight**.

As before, the SZL control unit is connected to the F-CAN.

Following control units are dropped together with the **byteflight**:

- SBSL: B-pillar satellite, left
- SBSR: B-pillar satellite, right
- TMBF: Door module, front-passenger
- TMFA: Door module, driver

- ACSM is added.

The crash safety system is controlled by a new control unit:

ACSM: crash safety module

The ACSM control unit is on the K-CAN.

("ACSM" = Advanced Crash Safety Module or Management)

[for further information, please refer to SI Technology (SBT) 65 05 05 138]

- ALBBF and ALBFA are added.

2 new control units for the active backrest width adjustment are added on the PT-CAN.

ALBBF: Active seat back width, front passenger seat

ALBFA: Active seat back width, driver's seat

[for further information, please refer to SI Technology (SBT) 52 02 04 116]

- CA is added.

A control unit for comfort access is added on the K-CAN.

CA: Comfort Access

[for further information, please refer to SI Technology (SBT) 66 04 04 093]

- KGM is added.

As of September 2005, the data interface for the buses is the body-gateway module (KGM). The previous data interface for the buses, the safety and gateway module (SGM) has been dropped.

The following functions are integrated in the KGM control unit:



- Data interface for buses
- Outside door handle electronics
- Vehicle centre satellite
- micro-power module

[for further information, please refer to SI Technology (SBT) 61 02 05 143]

- IBS: Intelligent battery sensor

The IBS is connected via the bit-serial data interface (BSD) to the engine control unit. The IBS has been part of the power supply on the BMW 5-Series since start of series production.

[for further information, please refer to SI Technology (SBT) 61 07 03 029]

- FLA is added.

A new control unit for the main-beam assistant is added on the K-CAN:

FLA: Main-beam assistant

[for further information, please refer to SI Technology (SBT) 63 01 05 140]

- For US vehicles: IBOC is added.

For US vehicles, a control unit is added to the MOST for analogue and digital radio reception.

IBOC: Digital tuner US

- For Korea vehicles: KNAV is added.

A control unit for the navigation system is added for vehicle in Korea.

KNAV: Korea navigation system

The KNAV control unit is connected to the MOST.

- A new control unit for the night vision assistant is added on the K-CAN:

NVE: night vision electronics

[for further information, please refer to SI Technology (SBT) 66 02 05 136]

- MPM dropped.

No micro-power module (MPM) on the K-CAN. The KGM control unit performs the functions of the MPM.

- For US vehicles: RDC is added.

For US vehicles, a new control unit added on the K-CAN for monitoring tyre pressure has been.

RDC: Tyre pressure control

> E60, E61, E63, E64 from 09/2005 until 03/2007: Buses and control units: [System overview ...]

Note: Modifications in the bus structures on the E60, E61, E63, E64 from 03/2005

From March 2005, the bus structures are modified as follows:

- AHL discontinued:

From March 2005, the AHL control unit (adaptive headlights) is integrated into the light module. The light module is connected to the K-CAN and the PT-CAN.

- The VTG is now also integrated: For the E60 and E61, an all-wheel drive vehicle is available. The control unit for the xDrive on the E60 and E61 is known as the VTG: Transfer case.

> E60, E61, E63, E64 from 03/2005 until 09/2005: Buses and control units: [System overview ...]

Note: Original version: Buses and control units on E60, E61 E63, E64 up to 03/2005

To support the workshops, the predecessor version of the bus structures on the E60 are also described below:

> E60, E61, E63, E64 until 03/2005: Buses and control units: [System overview ...]

Buses and control units in the E65 and E66

The main buses in the E65 and E66 are called: K-CAN P, K-CAN S, MOST, **byteflight**, Local CAN, PT-CAN.



Note: Modifications to the bus structures for the E65 and E66 from 03/2005

From March 2005, the AHL control unit (adaptive headlights) is integrated into the light module.
The light module is connected to the K-CAN S and the PT-CAN.
> E65 and E66 from 03/2005: Buses and control units: [System overview ...]

Note: Predecessor version: Buses and control units on E65, E66 from 03/2004

To support the workshops, a description of the predecessor version of the bus structures on the E65 and E66 is also provided:

The key modification compared to the original version of the bus structures on the E65 and E66 is:

SIM and ZGM have been combined to create the SGM. The SGM is the central data interface for all buses and control units.

(SIM: safety and information module)

(ZGM: central gateway module)

(SGM: safety and gateway module)

> E65 and E66 from 03/2004 to 03/2005: Buses and control units: [System overview ...]

Note: Original version: Buses and control units on E65, E66 up to 03/2004

To support the workshops, the original version of the bus structures on the E65 and E66 is also available:

In the original version, the E65, E66 had the two control units SIM and ZGM.

- SIM: safety and information module

The SIM was the data interface for the control units on the **byteflight** data bus.

- ZGM: Central gateway module

The ZGM is the central data interface for all buses and control units.

> E65 and E66 up to 03/2004: Buses and control units: [System overview ...]

Buses and control units in the E70

The important buses in the E70 are called: K-CAN, MOST, PT-CAN, F-CAN, FlexRay.

FlexRay is a new communication system that offers extremely efficient, real time data transfer between the electrical and mechatronic components in the vehicle. FlexRay has a data transfer rate of 10 MBit/s.

FlexRay is used for data exchange between the VDM control unit and the shock absorber satellites.

CHAMP: On the US national version, instead of the multi-audio system controller (M-ASK), the Central Headset And Multimedia Platform (CHAMP) operates as the BMW "Professional" radio. In contrast to M-ASK, CHAMP **does not** have a navigation system.

> E70: Buses and control units [system overview ...]

Buses and control units in E81, E82, E87

The important buses in the E87 are called: K-CAN, MOST, PT-CAN and F-CAN.

The MOST, the innovation in the bus structure on the E65 and E66, is now also used in the E81, E82, E87.

The central interface for data transmission is the junction box electronics (JBE) in the junction box.

> E81, E82, E87: Buses and control units [system overview ...]

Buses and control units on the E90, E91, E92, E93

The most important buses on the E90, E91, E92, E93 are: K-CAN, MOST, PT-CAN, F-CAN.

The new feature is that the footwell module (FRM) is connected to the PT-CAN. This is because:

- The adaptive headlights are integrated into the footwell module. The adaptive headlights need the high-speed PT-CAN.
- The longitudinal dynamics management sends the signal for the brake light on the PT-CAN.

> E90, E91, E92, E93: Buses and control units: [system overview ...]

Buses and control units on the R50, R52, R53

The most important buses on the R50, R52, R53 are: K-bus, PT-CAN.

The central interface for data transfer is the instrument cluster (KOMBI).



> R50, R52, R53: Buses and control units: [system overview ...]

Buses and control units in the R55, R56

The most important buses on the R55, R56 are: K-CAN, MOST, PT-CAN and F-CAN.

The central interface for data transmission is the junction box electronics (JBE) in the junction box.

> R55, R56: Buses and control units: [system overview ...]

Notes for service staff

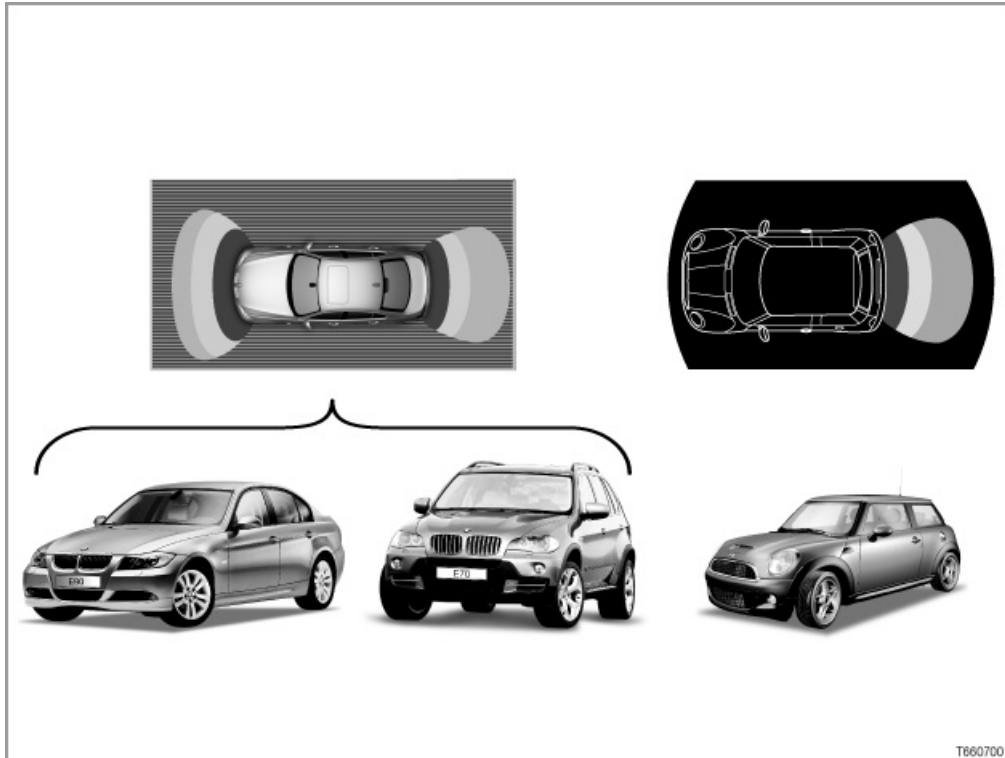
- General information: ---
- Diagnosis: [more ...]
- Programming: ---

Subject to change.



Park distance control

E70, E71, E81, E82, E84, E87, E88, E89, E90, E91, E92, E93, R55, R56, R57, R58, R59, R60, R61



Introduction

Park Distance Control (PDC) is an item of optional equipment. Park Distance Control (i.e.: park distance control) assists the driver when he is parking and manoeuvring in tight spaces. This means that even small car parks can be used. At the same time, the amount of parking damage is reduced. The PDC runs a distance measurement in relation to objects in the detection range by means of ultrasonic sensors.

- > E70, E71 (system supplier Valeo)
[System overview]
- > E81, E82, E84, E87, E88, E89, E90, E91, E92, E93 (system supplier Bosch)
[System overview ...]
- > R55, R56, R57, R58, R59, R60, R61 (system supplier Bosch)
[System overview ...]

PDC is available in the following equipment specifications:

- SA507: Park Distance Control (PDC) , rear
- SA508: Park Distance Control (PDC), front and rear

The PDC button in the centre console control panel is provided only with option SA508 .

Compared to earlier systems, PDC has the following new features:

- Modified ultrasonic sensor with decoupling element on sensor housing
- Increased range for ultrasonic sensor: 2.5 metres front and rear
- Good detection of obstacles while remaining insensitive to echo impulses from the ground

The driver is warned of an object that could cause a collision as follows:

- Acoustic warning via (depends on equipment fitted):



> E70, E71

- Mid-range speakers with Multimedia Platform (CHAMP), Multi-audio system controller (M-ASK) or Car Communication Computer (CCC)

> E81, E82, E84, E87, E88, E89, E90, E91, E92, E93

- 2 acoustic sensors (1 front, 1 rear) with radio without audio system
- Mid-range speaker with BMW "Professional" radio, multi-audio system controller or Car Communication Computer

> R55, R56, R57, R58, R59, R60, R61

- 1 acoustic sensor (rear) with Radio Wave
- Mid-range speaker with Radio Wave CD, Radio Boost CD or Car Communication Computer

- Visual warning by PDC image with multi-audio system controller and Car Communication Computer

The PDC offers increased comfort for the hard of hearing or persons with limited mobility, particularly by using the visual warning. If the noise level is high in the passenger compartment (e.g. loud music), the visual warning offers an additional advantage.

Important! The driver remains responsible at all times

PDC cannot substitute the driver's personal evaluation of obstructions. There is also a blind spot for the ultrasonic sensors. In this blind spot objects can no longer be detected. Identifying objects may reach the physical boundaries of ultrasonic measurement if the ultrasonic rays are not or only badly reflected (e.g. with trailer towbars or thin objects). Low-lying obstacles (e.g. tall kerbs) may be displayed and then 'disappear' **before** the continuous alarm is sounded. Loud sound sources outside and inside the vehicle can drown out the PDC signal tone. It therefore remains the driver's responsibility to watch for obstacles, even in vehicles with PDC.

Brief component description

PDC consists of the following components:

- **Ultrasonic sensors**

> E70, E71

8 ultrasonic sensors for SA508: Park Distance Control (PDC), front and rear

> E81, E82, E84, E87, E88, E89, E90, E91, E92, E93

4 ultrasonic sensors for SA507: Park Distance Control (PDC), rear

8 ultrasonic sensors for SA508: Park Distance Control (PDC), front and rear

> R55, R56, R57, R58, R59, R60, R61

4 ultrasonic sensors for SA507: Park Distance Control (PDC), rear

There are 4 ultrasonic sensors in each of the front and rear bumpers.

The ultrasonic sensors emit ultrasonic pulses. These ultrasonic pulses are reflected by obstacles (echo impulses).

The ultrasonic sensors receive and amplify these echo impulses. The amplified echo pulses are then converted into a digital signal. Each ultrasonic sensor has own electronic circuitry, voltage supply and data line to the PDC control unit.[more ...]

Important! Measuring range of ultrasonic sensors

The measuring range of the ultrasonic sensors is between approx. 25 centimetres and a maximum of approx. 250 centimetres. A continuous alarm is emitted at a distance of under approx. 25 centimetres. Dirt contamination, humidity, ice and snow may also trigger a continuous alarm.

Note: Cleaning the ultrasonic sensors

To make sure the system remains fully operational, keep the ultrasonic sensors clean and free from ice. Do not clean by spraying high-pressure washers directly at the ultrasonic sensors. When cleaning, always maintain a minimum distance of at least 10 centimetres.

Note: Make sure the decoupling element on ultrasonic sensor is correctly located.

The respective decoupling element must be correctly located. Otherwise the transmit/receive mode will be impaired.

- **PDC button**



The signal from the PDC button is read by the IHKA (or IHKR/IHR control unit) control unit. In turn, the IHKA control unit sends a signal on the K-CAN.

The PDC button is used to manually switch the Park Distance Control system on and off. When the PDC is switched on, the function LED in the PDC button lights up.

If a fault develops in the PDC, the function LED in the PDC button flashes.

- **PDC control unit**

The PDC control unit controls the ultrasonic sensors for transmitting ultrasonic pulses. The PDC control unit also receives the digital signals from the individual ultrasonic sensors. From the individual digital signals, the PDC control unit calculates the minimum distance between the ultrasonic sensor and the object.

When an object is detected, an acoustic warning and a visual warning are given.

- > E70, E71
[more ...]
- > E81, E82, E84, E87, E88, E89, E90, E91, E92, E93
[more ...]
- > R55, R56, R57, R58, R59, R60, R61
[more ...]

The PDC control unit is connected to various other control units via the bus system:

- **RAD2, CHAMP, multi-audio system controller or CCC: BMW "Professional" radio, Multimedia Platform, multi-audio system controller or Car Communication Computer**

> E70, E71, E81, E82, E84, E87, E88, E89, E90, E91, E92, E93

Depending on the equipment fitted, the audio master emits acoustic PDC warnings via the mid-range speaker.

- **Radio Wave CD, Radio Boost CD or CCC: Radio Wave CD, Radio Boost CD or Car Communication Computer**

> R55, R56, R57, R58, R59, R60, R61

Depending on the equipment fitted, the audio master emits acoustic PDC warnings via the mid-range speaker.

- **CID: Central information display**

> E70, E71, E81, E82, E84, E87, E88, E89, E90, E91, E92, E93

The visual PDC warnings are given in the Central Information Display (CID).

In addition, information regarding a Check-Control message that may be present is shown.

- **KOMBI: Instrument panel control unit**

> E70, E71, E81, E82, E84, E87, E88, E89, E90, E91, E92, E93

A current Check-Control message is indicated by a symbol in the LCD display in the instrument panel. Moreover, the instrument panel also provides the exterior temperature and the kilometre reading for the PDC control unit.

The PDC control unit is then able to correct the calculated distance with a factor corresponding to the ambient temperature.

- **KOMBI and CID: Instrument panel and Central Information Display**

> R55, R56, R57, R58, R59, R60, R61

The instrument panel has two sections. The actual instrument panel is in the centre of the dashboard. The auxiliary instrument is on the steering column.

The KOMBI and the CID are both control units. These control units are plugged into one another and installed together in the dashboard.

All equipment specifications are connected to the auxiliary instrument via a K-bus. The auxiliary instrument is the gateway to the K-CAN.



A current Check-Control message is indicated by a symbol in the LCD display in the auxiliary instrument.

The instrument panel provides the ambient temperature and the kilometre reading for the PDC control unit. The PDC control unit is then able to correct the calculated distance with a factor corresponding to the ambient temperature.

- **EGS: Electronic transmission control**

On vehicles with automatic transmission, the electronic transmission control (ESG) supplies the signal that reverse gear is engaged.

The PDC control unit activates PDC after a short delay (approx. 1 second). This prevents PDC from being unexpectedly activated on vehicles with automatic transmission, for example when the selector lever is moved from "P" to "N" via "R".

- **: Dynamic stability control**

The DSC control unit supplies the PDC with information about the driving speed and distance travelled.

- **FRM: Footwell module**

On vehicles with manual transmission, the footwell module (FRM) supplies the signal that reverse gear is engaged.

- **CAS: Car Access System**

The CAS control unit supplies the PDC with the terminal status (e.g. terminal 15).

- **AHM: Trailer module**

The trailer module (AHM) sends a signal indicating whether the vehicle is towing a trailer or if a rear carrier rack is fitted. If a trailer or rear carrier rack is recognised, the acoustic and visual warnings for the rear bumper are deactivated.

System functions

PDC incorporates the following functions:

- Acoustic warnings
- Visual warning with multi-audio system controller and Car Communication Computer
- Check Control
- System limits

Acoustic warning

The acoustic warnings are emitted by:

> E70, E71

- Mid-range speaker with CHAMP, M-ASK or CCC

If an object is detected by 2 ultrasonic sensors, the speaker closest to the object is actuated. The mid-range speakers can be actuated. (depending on the vehicle type concerned, the mid-range speakers in the left/right front doors or left/right rear doors are actuated, for example)

If an object is detected by the central ultrasonic sensors, the mid-range speakers on the left and right-hand sides are actuated together.



> E81, E82, E84, E87, E88, E89, E90, E91, E92, E93

- 2 acoustic sensors (1 front, 1 rear) with radio without audio system

The PDC control unit directly actuates the acoustic sensors (front/rear in passenger compartment). Within the acoustic sensor, the control signal is transformed to approx. 48 volts. This voltage excites a piezo-ceramic element that together with the resonator (housing) generates a warning tone.

Up to 09/2006, the tone is in the frequency range of approximately 1 kHz.

From 09/2006 the tone is in the frequency range of approximately 1.5 kHz (front) or 1.0 kHz (rear).

- Mid-range speaker with RAD 2, M-ASK or CCC

If an object is detected by 2 ultrasonic sensors, the speaker closest to the object is actuated.

The mid-range speakers can be actuated. (e.g. the mid-range speakers in the front doors, left/right, in the storage shelf, left/right, in the rear doors, left/right, in the storage shelf, left/right or in the rear side trim panel, left/right are actuated, depending on the vehicle type.)

If an object is detected by the central ultrasonic sensors, the mid-range speakers on the left and right-hand sides are actuated together.

> R55, R56, R57, R58, R59, R60, R61

- 1 acoustic sensor (rear) with Radio Wave

The PDC control unit directly actuates the acoustic sensors (in rear of passenger compartment). Within the acoustic sensor, the control signal is transformed to approx. 48 volts. This voltage excites a piezo-ceramic element that together with the resonator (housing) generates a warning tone. The tone is in the frequency range of approximately 1 kHz.

- Mid-range speakers with Radio Wave CD, Radio Boost CD or CCC

If an object is detected by 2 ultrasonic sensors, the speaker closest to the object is actuated. The mid-range speaker on the left/right can be actuated.

If an object is detected by the central ultrasonic sensors, the mid-range speakers on the left and right-hand sides are actuated together.

The distance to the object determines the tone sequence for the acoustic warning (the smaller the distance, the faster the tone sequence).

A distance of less than approx. 25 centimetres is indicated by a continuous tone. The continuous alarm is emitted alternately from the front and the rear.

If the vehicle moves away from the object, the warning tone will be cancelled when the distance increases by more than 10 centimetres.

Detection range for acoustic warnings:

- approx. 60 centimetres for the ultrasonic sensors at the two corners of the front bumper
- approx. 70 centimetres for the two middle ultrasonic sensors in the front bumper
- approx. 60 centimetres for the ultrasonic sensors at the two corners of the rear bumper
- approx. 150 centimetres for the two middle ultrasonic sensors in the rear bumper



Optical warning with multimedia platform or multi audio system controller or Car Communication Computer

The visual PDC warnings are given in the Central Information Display (CID). This is subject to the PDC display in the CID being active.

The visual warnings are given earlier than the acoustic warnings.

The effective detection range is approx. 2.5 metres at the front and rear.

The schematic diagram is shown on the CID. The PDC control unit supplies the distance between the ultrasonic sensor and the object detected via the K-CAN.

The PDC picture on the CID is an overhead view of the vehicle with the detection range of the ultrasonic sensors.

The distance to objects detected is shown in the colours of traffic lights:

- Distance between 200 (250) and 101 centimetres: green
- Distance between 100 and 51 centimetres: yellow
- Distance less than 50 centimetres: Red

The PDC display appears as soon as the PDC is switched on (manually or automatically). The PDC display overrides other displays in the CID. When the PDC is switched off again, the previous display automatically appears again in the Central Information Display.

Check Control

If a fault should develop in the PDC, the function LED in the PDC button will flash with a frequency of 2 Hz.

In this situation, PDC cannot be switched on.

At the same time, a Check-Control message is displayed in the following form

- Symbol in the LCD display in the instrument panel
- The following text appears in the status line of the Central Information Display:

"PDC failure!"

In the menu "BMW Service", the following text can be called up in the submenu "Check-Control messages":

"Park Distance Control

No acoustic warning available for Park Distance Control PDC.

Have the problem checked by BMW Service as soon as possible."

If a fault entry is recorded, the kilometre reading and the ambient temperature are recorded along with the type of fault.

System limits

Important! The driver remains responsible at all times

PDC cannot substitute the driver's personal evaluation of obstructions. There is also a blind spot for the ultrasonic sensors. In this blind spot objects can no longer be detected. Identifying objects may reach the physical boundaries of ultrasonic measurement if the ultrasonic rays are not or only badly reflected (e.g. with trailer towbars or thin objects). Low-lying obstacles (e.g. tall kerbs) may be displayed and then 'disappear' **before** the continuous alarm is sounded. Loud sound sources outside and inside the vehicle can drown out the PDC signal tone. It therefore remains the driver's responsibility to watch for obstacles, even in vehicles with PDC.



During operation, the following system functions, which require explanation, can occur due to the limits of the functional range (for the driver):

- Under the following conditions, it could happen that the PDC gives a warning, even though there is no obstacle within the effective detection range:
 - Ultrasonic sensor incorrectly located in its bracket
 - Heavy rainfall
 - Ultrasonic sensors covered in snow
 - Exhaust gases
 - Echo impulses caused by ground, e.g. extremely coarse road surface or high grass
 - Very smooth walls in large, enclosed, rectangular spaces, e.g. in underground car parks (interference from previously reflected echo impulses)
 - Protective cap for trailer coupling ball head incorrectly seated or objects being transported protruding into the effective detection range of the ultrasonic sensors.
- Under the following conditions, the PDC may not recognise an obstacle that is present:
 - Objects close to the ground (no reflection)
 - Objects with corners and sharp edges (no reflection)
 - If you drive alongside a wall for more than 3 seconds, the acoustic warning will be deactivated. Here, the distance must be greater than the effective detection range for the continuous alarm (approx. 25 centimetres). As soon as the distance drops below 25 centimetres, the continuous alarm will sound again.
 - If the vehicle approaches an object too fast
 - Starting up and moving away too quickly while PDC is starting

Conditions for switching on and off

PDC is switched on under the following conditions:

- PDC button is pressed (PDC switched on manually), only option SA508
- Reverse gear engaged (PDC switched on automatically)

PDC is switched off under the following conditions:

- Reverse gear disengaged, only option SA507
- PDC button is pressed (PDC switched off manually), only option SA508
- Ignition switched off (PDC switched off automatically)
- After driving approx. 50 meters
- After exceeding a speed of 30 km/h

When towing a trailer or using a rear carrier, the acoustic and visual warning for the rear bumper is switched off via the trailer module (AHM). The trailer or rear carrier rack must be electrically connected for this purpose.

Operation

The visual warning (PDC display) is switched on in the Central Information Display (CID) as follows:

- "Settings (i)" menu
- "Vehicle settings" menu
- "PDC" menu
- Activate "Display on"

Notes for Service department

The following information is available for service staff:

- General information: [more ...]
- Diagnosis: ---
- Encoding/programming: ---

Japanese market version

An acoustic signal (reversing gong) is output by the acoustic generator or the mid-range speaker as long as reverse gear is engaged. The reversing gong is immediately switched off when the PDC recognises an object



in the detection range and an acoustic warning is triggered.

We can assume no liability for printing errors or inaccuracies in this document and reserve the right to introduce technical modifications at any time.



00 03 06 (147)

Condition Based Service

MINI R55, R56, R57, R58, R59, R60 and R61



System functions

8 maintenance operations are performed by the Condition Based Service:

- Engine oil
- Brake pads, front
- Brake pads, rear
- Vehicle check
- Brake fluid
- Statutory vehicle inspection
- Pre-delivery check
- Diesel fuel additive until

For clarity, the maintenance operations with their intervals are shown first (valid for EURO vehicles). In particular countries the values for engine oil, for example, may differ.

<u>Scope</u> (calculated by)	<u>Interval</u>	<u>Starting value/interval forecast</u>		<u>Time reference</u>
		Distance [km]	Time [Months]	
<u>Engine oil</u> (DME/DDE)	flexible	DME: 30.000 DDE: 20.000 From 08/2010: 30.000	24 24	on-board date
<u>Brake pads, front</u> (DSC)	flexible	50.000	---	---



<u>Brake pads, rear</u> (DSC)	flexible	50.000	---	---
<u>Diesel fuel additive</u> (DDE)	flexible	200.000	---	---
<u>Vehicle check</u> (instrument panel)	fixed	DME: 60.000 DDE: 60.000	48 48	on-board date
<u>Brake fluid</u> (instrument panel)	fixed	---	24	on-board date
<u>Statutory vehicle inspection</u> (instrument panel)	country-specific	---	encodable	on-board date
<u>Pre-delivery check</u> (instrument panel)	fixed	---	1	on-board date

Important! The reference time for time-dependent maintenance operations is the on-board date

The on-board date is used for the display of escalation (green symbol, yellow symbol, red symbol). Furthermore, the on-board date serves as the basis to sort the maintenance operations in the display. The on-board date stops when the battery is flat or disconnected and must then be corrected in the vehicle. The on-board date **must** be correctly set before resetting the maintenance operations. Resetting is described in the general service information.

Maintenance operations coupled at the engine oil:

- Passenger compartment microfilter
- Spark plug
- Air filter
- Fuel filter (diesel fuel)

You will find the information on the respective couplings in the Engine oil service document.

Other maintenance operations:

- Vehicles built before 08/2010:
Toothed belt (diesel fuel): approx. 200,000 km.
- Vehicles built before 08/2010:
Poly-V belt (diesel fuel): approx. 200 000 km.

Key Service data

The concealed function for updating the key data is triggered as follows:

- Insert master key in the insertion slot
- Keep the central locking button pressed
- Change the terminal by pressing the START/STOP button
- Wait approximately 10 seconds (central locking button can be released)
- When the key data is updated an acoustic signal will sound

General information on Condition Based Service

Resetting a maintenance measure in the vehicle



Note: First perform the maintenance measure

A maintenance measure must only ever be reset **after** it has been performed.

Note: Perform a reset after instruction

The resetting process is interrupted if the time is exceeded or if a terminal is changed.

On the vehicle, maintenance operations can be reset at the instrument panel. Here, the availability of a service job is reset to 100 % (corresponding to new part). The availability is an internal computing value (not visible to the operator).

The following sequence must be observed if you are resetting with the trip distance recorder reset button:

- switch on terminal 15
- Press and hold the trip distance recorder reset button for 10 seconds until the 1st scope of maintenance work appears in the LCD display.
- The upper display in the speedometer is illuminated by a service symbol (e.g.: an oil can is the symbol for an oil change).

The lower display in the speedometer indicates the time or distance remaining until the next service (e.g.: 14000).

Scroll by repeatedly pressing the on-board computer button.

- To reset, press and hold the on-board computer button on the direction indicator/main-beam switch until "RESET" appears in the lower display.
- Pressing the on-board computer button again will reset the service shown in the upper display.
- Repeat the procedure for each additional service which is to be reset.

Note: Resetting increases the service counter

Each reset increases the service counter for the operation concerned by 1. The service counter is used in SAM for operation-specific control of additional work.

Note: Sorting is chronological

The order of maintenance measures is chronologically sorted. The most critical item is displayed first.

Note: Vehicle inspection and exhaust-gas test vary from country to country.

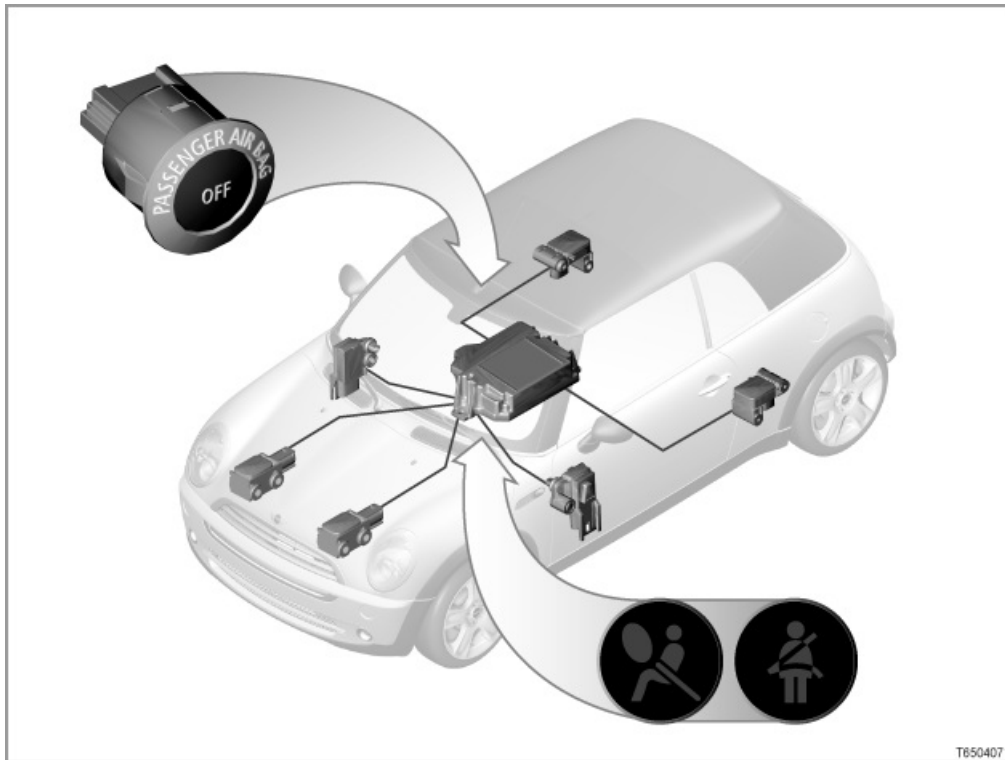
The intervals stipulated locally by law are encoded with the BMW diagnosis system.



65 03 05 (115)

Multiple restraint system 5

R50, R52, R53



Introduction

The multiple restraint system 5 (MRS) is a direct development of the multiple restraint system fitted to MINI vehicles.

The multiple restraint system 5 is only fitted to US-version MINI vehicles.

[System overview ...]

The MRS performs the following functions:

- Recognises accident situations that are critical for vehicle occupants
- Activates the necessary restraint systems in the event of an accident (selectively, depending on the severity and type of accident)

Brief description of components

The following sensors detect the direction and severity of an impact:

- **Acceleration sensors in the MRS control unit**

There is a lateral acceleration sensor and a longitudinal acceleration sensor in the MRS control unit. The sensors are arranged at 90 degrees to each other.

- **Airbag sensors on left-hand B-pillar and right-hand B-pillar**

Each of the airbag sensors on the B-pillars contains a lateral-acceleration sensor and a longitudinal-acceleration sensor. The sensors are arranged at 90 degrees to each other.

[more ...]

- **Front airbag sensors**

The 2 front airbag sensors are longitudinal acceleration sensors.

[more ...]



- **Airbag sensors on front left door and front right door**

The 2 airbag sensors are pressure sensors.

[more ...]

The following components provide additional input signals for the multiple restraint system:

- **Passenger seat occupancy detector**

Statutory guidelines in the USA stipulate that the seat occupancy detector mat integrated into the front-passenger seat must be able to recognise a child seated in a rearward-facing child seat. Upon detection, the airbags on the passenger side are automatically deactivated (passenger airbag and side airbag). The indicator lamp for passenger airbag deactivation lights up.

The seat-occupancy detector evaluates the impression caused from a load on the seat.

If the multiple restraint system (MRS) triggers the airbags and the front-passenger seat is unoccupied, the front-passenger airbag and the side airbag on the front-passenger side will not be triggered.

The head-level airbag will still be triggered.

[more ...]

- **Seat-belt buckle switch for driver's seat and front-passenger seat**

The MRS control unit uses the signals from the driver's seat-belt buckle switch and the front-passenger seat-belt buckle switch to detect whether or not the seat belts are fastened.

If the seat belt is fastened, the seat-belt tensioner will also be triggered (only in the event of frontal impact or a rear-end collision).

The following control units are involved in the function of the MRS:

- **MRS control unit**

All triggering circuits and sensors in the multiple restraint system (MRS) are connected directly to the MRS control unit.

The MRS control unit evaluates the data it receives from the sensors. In the event of a collision (head-on, rear-end or side impact), the MRS control unit will decide whether the seat-belt tensioners and airbags need to be triggered, and which airbags need to be triggered.

[more ...]

- **DME: Digital engine electronics**

Depending on accident severity, the electric fuel pump will be switched off by the DME.

Signal path:

MRS control unit -> K-bus -> General module -> K-bus -> Instrument cluster -> PT-CAN -> DME -> Direct wire -> Fuel-pump relay -> Electric fuel pump

- **Instrument cluster**

The instrument cluster generates the optical and audible seat-belt warning.

When terminal R is ON, the instrument cluster receives the status message from the MRS control unit via the K-bus. Depending on the status, the optical and audible warning is triggered when terminal 15 is ON.

- **GM: General module**

The general module is connected to the MRS control unit via the K-bus.

The general module is the executing control unit for the central locking system. The general module also controls the interior and exterior lighting.

Depending on severity, the central locking is unlocked in the event of an accident. The interior lights and the hazard warning lights are automatically switched on.

Signal path: MRS control unit -> K-bus -> General module

The following components are activated by the MRS control unit:

- **Multiple restraint system triggering circuits**

With maximum equipment, the MRS (multiple restraint system) comprises the following triggering circuits:

- Driver's airbag (stage 1)
- Front-passenger airbag (stage 1)



- Driver's airbag (stage 2)
- Front-passenger airbag (stage 2)
- Side airbag in driver's seat
- Side airbag in front-passenger seat
- Head-level airbag, left (optional)
- Head-level airbag, right (optional)
- Belt tensioner, front left
- Belt tensioner, front right
- Safety battery terminal

Driver and front-passenger airbag

The driver and front-passenger airbag reduce the risk of injury to the occupants' head and chest area in the event of a head-on collision.

The driver airbag is located under the centre pad on the steering wheel. The front-passenger airbag is integrated into the instrument panel above the glove compartment.

Side airbag

The side airbags are located in the side sections of the front-seat backrests.

The relocation into the backrest side section has the advantage that there are no longer airbags in the doors, allowing the engineers more freedom when designing the doors.

Both versions, airbags in doors and airbags in seats, satisfy the strict legal requirements with regard to occupant safety to the same degree.

Side airbags reduce the risk of injury to the pelvis and torso of the driver and front passenger's in the event of a side impact.

[more ...]

Head-level airbag

The head-level airbag prevents the head making direct contact with the side structure or an object which penetrates the vehicle. The head-level airbag thus reduces the risk of head injuries for vehicle occupants. (the head-level airbag is optional.)

[more ...]

Belt tensioners

As a rule, the seat belt will not be sitting completely tight around the body: This seat belt slack makes sure that the occupants have adequate comfort of movement.

To prevent the negative effect that this loose belt can have, the pyrotechnic seat-belt tensioner will pull the belt buckle down by several centimetres in the event of a frontal or rear-end collision. This pulls the seat belt tight into the occupant's shoulder and pelvis.

Safety battery terminal

Depending on the severity of the accident, the safety battery terminal disconnects the starter motor and the alternator from the battery. (only diesel vehicles and R53.)

This minimises the risk of short circuits in a serious accident. The trigger signal comes from the MRS control unit.

• Airbag warning lamp

The airbag warning lamp shows the operational capability of the multiple restraint system (MRS). The airbag indicator lamp in the instrument cluster is activated by the MRS control unit (via the K-bus).

After the ignition is switched on, the MRS performs a self test. During this time, the airbag indicator lamp will light up (approximately 3 to 5 seconds). When the system is ready for operation, the airbag indicator lamp goes out.

If the instrument cluster has not received a bus signal, the airbag indicator lamp will light up.

If, during the self test or while the vehicle is in motion, the MRS control unit detects an existing fault or one



that has been stored, the airbag warning lamp remains on.

If the MRS detects a fault, the operational capability is partially maintained, subject to the following:

- If a fault is detected in an MRS circuit, only the affected circuit is deactivated. The other airbags and belt tensioners remain operational.
- If there is a fault in the airbag warning lamp circuit, the lamp does not light up during the self-test. If there is no other fault, the MRS remains fully operational.

If there is an internal fault in the MRS control unit or in the power supply, the entire system is deactivated. (airbag and seat belt warning lights come on)

- **Seat-belt indicator lamp**

The seat-belt indicator lamp is the visual seat-belt warning. The visual seat-belt warning instructs the front-seat occupants to fasten their seat belts. Terminal 15 ON activates the visual seat-belt warning.

The visual seat-belt warning is issued as follows:

- Seat-belt indicator lamp in the instrument cluster (required by law)

- **Indicator lamp for front-passenger airbag deactivation**

After the ignition is switched on, the MRS performs a self test. In this time, the warning lamp for passenger-airbag deactivation lights up (approx. 3 to 5 seconds). The status of the airbags on the passenger side (passenger airbag and side airbag) is then displayed.

If the warning lamp for passenger-airbag deactivation ("Passenger Airbag OFF" lamp) is lit, the following airbags on the (occupied) passenger side have been deactivated: front-passenger airbag and side airbag.

The "Passenger Airbag OFF" lamp is constantly monitored by the MRS control unit. A fault in the power supply or a defective lamp is stored in the MRS control unit's fault memory. If this occurs, the airbag warning lamp is switched on.

"Passenger Airbag OFF" lamp installation location

- > R50/R53: roof console
- > R52: cowl panel

- **Electric fuel pump cutoff**

Depending on accident severity, the fuel supply may also be cut off.

Signal path:

MRS control unit -> K-bus -> General module -> K-bus -> Instrument cluster -> PT-CAN -> DME -> Fuel-pump relay -> Electric fuel pump

Mechanical components in the multiple restraint system (MRS):

- **Belt force limiters on seat belts**

The seat belts are the primary restraint system for all occupants. Each of the 4 seats is fitted with a lap and diagonal automatic belt.

To minimise the load on the chest area of the front passengers in the event of a severe head-on collision, the front seat belts are fitted with belt force limiters as standard. The belt force limiters ensure that the belt strap can give slightly if the load exceeds a certain level. The risk of injury due to the belt force acting on the body is thus reduced.

- **Knee protection**

An additional impact protection is fitted in the area of the knees on the driver's and front-passenger side. This knee protection provides extensive support for the knees in the event of an accident. The knee protection reduces the load on the lower extremities, especially if the front occupants are not wearing their seat belts.

At the same time, a controlled forward movement of the upper body towards the relevant airbag (driver or passenger airbag) is initiated.

System functions

The following system functions of the multiple restraint system (MRS) are described:



- Triggering the multiple restraint system
- Visual and audible seat-belt warning

Triggering the multiple restraint system

Extensive testing has allowed the triggering thresholds to be determined for all possible types of accidents.

The following triggering thresholds were set for activating the different restraint systems:

- Seat-belt tensioner
- Front airbags
- Side airbags and head-level airbags
- Safety battery terminal
- Electric fuel pump

The following examples illustrate how the various restraint systems are triggered:



- **Head-on collision**

The belt tensioner and the front airbags are activated if frontal impact is sufficient to exceed the triggering thresholds in the MRS control unit.

The belt tensioners have a lower triggering threshold than the front airbags. This means that depending on accident severity, only the belt tensioner may be activated by the MRS control unit. If the seat-belt buckle switch is faulty, the MRS control unit will attempt to activate the belt tensioner in spite of the error message.

If the seat-occupancy detector is faulty, the control unit assumes that the passenger seat is **not** occupied. The restraint systems are **not** activated.

Depending on accident severity, the safety battery terminal is activated and the electric fuel pump switched off.

- **Side impact**

If the triggering threshold in the MRS control unit is exceeded, the side airbag and the head-level airbag on the side affected by the impact are activated.

Depending on accident severity, the safety battery terminal is activated and the electric fuel pump switched off.

- **Front diagonal impact**

The airbags and belt tensioners are triggered depending on the rate of vehicle deceleration in a longitudinal or lateral direction.

If several triggering thresholds are exceeded, the corresponding restraint systems will be triggered for frontal collision and/or side impact (front airbag, side airbag, head-level airbag).

Depending on accident severity, the safety battery terminal is activated and the electric fuel pump switched off.

- **Rear-end collision**

The belt tensioners are activated if rear impact is sufficient to exceed the triggering threshold in the MRS control unit.

Depending on accident severity, the safety battery terminal is activated and the electric fuel pump switched off.

- **Rear diagonal impact**

The airbags (side airbags, head-level airbags) and belt tensioners are triggered depending on the rate of vehicle deceleration (or acceleration). If a number of triggering thresholds are exceeded, the appropriate restraint systems are activated.

Depending on accident severity, the safety battery terminal is activated and the electric fuel pump switched off.

- **Rollover**

The MRS control unit does not detect the vehicle rolling over.

The corresponding restraint systems are triggered: for example if the side impact causes the vehicle to roll over or if impact occurs while the vehicle is rolling over and the operating thresholds in the MRS control unit are exceeded.

Depending on accident severity, the safety battery terminal is activated and the electric fuel pump switched off.



Visual and audible seat-belt warning

For the seat-belt warning, the signals of the 2 seat-belt buckle switches (driver's belt/front-passenger belt) are monitored separately.

If the seat occupancy detector detects that the passenger seat is occupied, the passenger belt must be inserted into the seat belt buckle. This switches off the seat-belt warning.

The following situations are taken into account in respect of the issuing of a seat-belt warning:

- **Front seat belt not fastened and distance driven less than 200 m**

- Driver's side only:

If the distance driven is less than 200 m, only the seat-belt warning lamp lights up. The vehicle may for example be driven out of a garage without triggering an acoustic seat-belt warning.

- **Front seat belt not fastened and distance driven more than 200 m**

The seat-belt warning lamp lights up. The acoustic seat-belt warning is activated for approximately 90 seconds.

Once the seat belt has been fastened, the seat-belt warning lamp goes out. The acoustic seat-belt warning is deactivated.

- Driver's side:

If the seat belt has **not** been fastened by the end of the acoustic seat-belt warning, the seat-belt warning lamp will stay on.

- Passenger side:

If the seat belt has **not** been fastened by the end of the acoustic seat-belt warning, the seat-belt warning lamp and the acoustic seat-belt warning are deactivated.

- **Unfastening the front seat belt when the vehicle is in motion**

- Driver's side:

The seat-belt warning lamp lights up immediately.

After approx. 15 seconds an acoustic seat-belt warning is activated for approx. 90 seconds.

Once the seat belt has been fastened, the seat-belt warning lamp goes out. The audible seat-belt warning is deactivated.

If the seat belt has **not** been fastened by the end of the acoustic seat-belt warning, the seat-belt warning lamp will stay on.

- Passenger side:

After approximately 15 seconds, the seat-belt warning lamp will light up and an audible seat-belt warning will be issued for approx. 90 seconds.

Once the seat belt has been fastened, the seat-belt warning lamp goes out. The audible seat-belt warning is deactivated.

If the seat belt has **not** been fastened by the end of the acoustic seat-belt warning, the seat-belt warning lamp and the acoustic seat-belt warning are deactivated.

Note: Deactivating the acoustic seat-belt warning

The acoustic seat-belt warning can be deactivated using encoding.

This does not affect a legally stipulated seat belt warning.

Notes for service staff

- General information: [more ...]
- Diagnosis: [more ...]
- Encoding/programming: ---
- Car & Key Memory: ---



65 06 04 (101)

Radio

E87, E90, E91, E92, R56



Introduction

There are several different radio stages for the BMW 1-Series, the BMW 3-Series and the MINI.

> E87

The BMW 1-Series is also available without a radio. If it is supplied without a radio, it does not feature a radio wiring harness.

The following options are available for the BMW 1-Series:

- Option 667 BMW "Audio" radio (without drive)
- Option 662 BMW "Business CD" radio (with CD drive)
- Option 663 BMW "Professional" radio (with CD drive)
- Option 651 "MD drive", only in conjunction with option 663 BMW "Professional" radio

> E90, E91, E92

The BMW 3-Series is equipped with the BMW "Business CD" radio, even in its basic equipment version. The US version even has the BMW "Professional" radio. All other options available for the BMW 1-Series are also available for the 3-Series.

> R56

The R56 is equipped with the MINI "Wave" radio in the basic equipment level.

The following options are available for the R56:

- Option 6FB MINI "Wave CD" radio (with CD drive)
- Option 6FC MINI "Boost CD" radio (with CD drive)

A MOST bus is provided from the BMW "Professional" or MINI "Boost CD" radio upwards. The radio is the data interface (gateway) between the MOST bus and the K-CAN.



> E87, E90, E91, E92: [System overview ...]

> R56: [System overview ...]

Brief description of components

The radios comprise the following components:

- **Radio**

The tuner is able to receive AM and FM stations. The tuner also receives additional information such as RDS (Radio Data System).

> E87, E90, E91, E92

[more ...]

> R56

[more ...]

- **Amplifier**

Amplifiers are integrated in the radios. The stereo audio system can be operated with these amplifiers. For the HiFi and Top-HiFi audio systems, external amplifiers are used.

[more ...]

- **Audio systems**

Various audio systems can be combined with the radios.

> E87, E90, E91, E92

[more ...]

> R56

[more ...]

The radios receive signals from the following components:

- **Aerials**

Most aerials are integrated in the rod aerial, roof-mounted aerial, side window (rear) and in the rear window.

[for further information, please refer to SI Technology (SBT) 65 02 05 114]

- **AUX-In connection**

An external audio device can be connected to the AUX-In connection (e.g. an MP3 player)

- **Telephone**

The telephone supplies the signal to switch the radio to mute. The telephone also sends the low-frequency output signal to output calls via the loudspeaker. The signals are transmitted directly. From BMW "Professional" or MINI "Boost CD" radio upwards, signals can be transmitted through the MOST.

- **CD changer**

> E87, E90, E91, E92: from BMW "Professional" radio

The CD changer supplies low-frequency output signals via the MOST for activating the output stages.

> R56: from MINI "Boost CD" radio

The CD changer on the R56 does not need a magazine. Up to 6 CDs can be fed in turn into the slot of the CD changer (please refer to the Owner's Handbook).

The CD drive is able to play standard audio CDs or CDs with compressed audio data (MP3/WMA). WMA (Windows Media Audio) is a compression standard, like MP3 (MPEG Layer 3, i.e. Moving Pictures Expert Group).

- **DSC: Dynamic Stability Control**

The Dynamic Stability Control control unit sends a road speed signal. This signal is used to control speed-dependent volume control.

- **SZL: Steering column switch cluster**

The steering column switch cluster supplies the signals for the multi-function steering wheel (MFL). The information is sent on the K-CAN and processed by the radio.



- **KOMBI: Instrument cluster**

> E87, E90, E91, E92

The instrument cluster is the unit master in the vehicle. The time, external temperature and consumption values, for example, are sent to the radio.

These settings can also be made via the radio with the BMW "Professional" radio and higher.

> R56

On the R56, the time, outside temperature and fuel consumption data (for example) are transmitted by the auxiliary instrument (KOMBI2) to the K-CAN.

Depending on the equipment fitted, the instrument cluster (KOMBI) may have recesses for:

- Radio control panel
- Central Information Display (CID) on vehicles with Car Communication Computer (CCC)

The radios output the following signals via the loudspeakers:

For all radios:

- **Audio signals**

From BMW "Professional" or MINI "Boost CD" radio:

- **Park Distance Control (PDC)**
- **Acoustic warnings (e.g. acoustic signals)**

System functions

BMW "Audio"/MINI "Wave" radio

BMW "Business CD"/MINI "Wave CD" radio

These radios are almost identical in their functions and construction. They are operated in the same way as radios that have featured in other models, such as the E46.

The radios do not have a digital sound processor (DSP) to generate sound. Therefore, they do not support signal generation as is necessary for the Park Distance Control System (PDC), for example. The signal tones in this case are generated by the corresponding control units themselves.

BMW "Professional" / MINI "Boost CD" radio

The BMW "Professional" radio and MINI "Boost CD" radio are radios for the MOST network.

The CD drive can play both standard audio CDs and CDs with compressed audio data (MP3/WMA).

The BMW "Professional" radio and MINI "Boost CD" radio have the following functions:

Gateway

The radio forms the interface for data exchange between the MOST bus and the K-CAN. The two bus systems use different data transmission rates and data formats. In order to communicate with both systems, the data from one bus is converted to a compatible format for the other in the radio.

- **System master**

The system master links the individual control units.

- **Power master**

The power master initialises the network and switches the buses on and off (wake-up, sleep mode).

- **Network master**

The network master controls and monitors the MOST bus. Each time the network is started up, the system configurations are detected and compared with a stored specified configuration. If systems do not work correctly, these are reset and separated from the MOST bus. Each error or deviation from the specified configuration is saved in a fault memory for the MOST bus.



Audio system controller

- Audio master

The audio master collects, evaluates and controls all audio signals in the vehicle. The audio master outputs the signals in order of priority via the loudspeakers. The audio master also produces additional audible signals for warnings and for Park Distance Control (PDC). By mixing or fading in and out, a "softer" audible change is obtained between the signal sources.

- Connection master

The connection master distributes the signals of the audio sources and the audible signals to the loudspeakers. The connections to digital audio sources are made, disconnected and enabled by the connection master.

The signals are transmitted to the loudspeakers in the following way:

- Front left and right:
Acoustic signals, telephone
- Front and rear: Signals from Park Distance Control (PDC)
- All loudspeakers: All sources in the "Entertainment" menu, traffic reports

Notes for service staff

Service staff should note the following points:

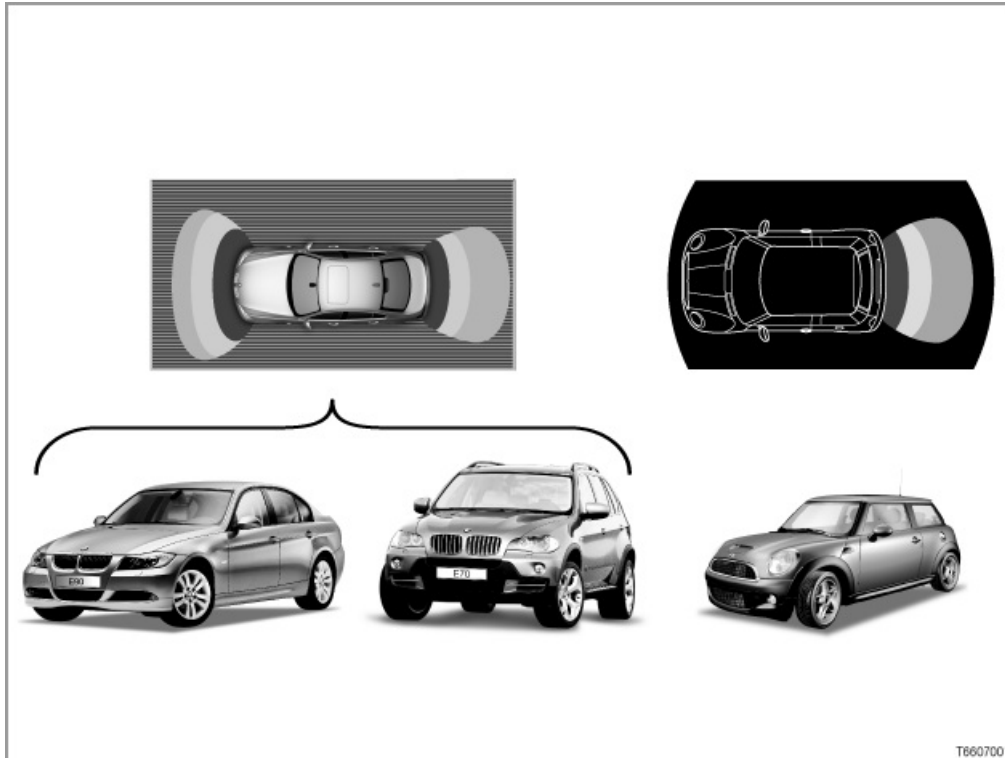
- General note: [more ...]
- Diagnosis: ---
- Encoding/programming: ---

Subject to change.



Park distance control

E70, E71, E81, E82, E84, E87, E88, E89, E90, E91, E92, E93, R55, R56, R57, R58, R59, R60, R61



Introduction

Park Distance Control (PDC) is an item of optional equipment. Park Distance Control (i.e.: park distance control) assists the driver when he is parking and manoeuvring in tight spaces. This means that even small car parks can be used. At the same time, the amount of parking damage is reduced. The PDC runs a distance measurement in relation to objects in the detection range by means of ultrasonic sensors.

- > E70, E71 (system supplier Valeo)
[System overview]
- > E81, E82, E84, E87, E88, E89, E90, E91, E92, E93 (system supplier Bosch)
[System overview ...]
- > R55, R56, R57, R58, R59, R60, R61 (system supplier Bosch)
[System overview ...]

PDC is available in the following equipment specifications:

- SA507: Park Distance Control (PDC) , rear
- SA508: Park Distance Control (PDC), front and rear

The PDC button in the centre console control panel is provided only with option SA508 .

Compared to earlier systems, PDC has the following new features:

- Modified ultrasonic sensor with decoupling element on sensor housing
- Increased range for ultrasonic sensor: 2.5 metres front and rear
- Good detection of obstacles while remaining insensitive to echo impulses from the ground

The driver is warned of an object that could cause a collision as follows:

- Acoustic warning via (depends on equipment fitted):



> E70, E71

- Mid-range speakers with Multimedia Platform (CHAMP), Multi-audio system controller (M-ASK) or Car Communication Computer (CCC)

> E81, E82, E84, E87, E88, E89, E90, E91, E92, E93

- 2 acoustic sensors (1 front, 1 rear) with radio without audio system
- Mid-range speaker with BMW "Professional" radio, multi-audio system controller or Car Communication Computer

> R55, R56, R57, R58, R59, R60, R61

- 1 acoustic sensor (rear) with Radio Wave
- Mid-range speaker with Radio Wave CD, Radio Boost CD or Car Communication Computer

- Visual warning by PDC image with multi-audio system controller and Car Communication Computer

The PDC offers increased comfort for the hard of hearing or persons with limited mobility, particularly by using the visual warning. If the noise level is high in the passenger compartment (e.g. loud music), the visual warning offers an additional advantage.

Important! The driver remains responsible at all times

PDC cannot substitute the driver's personal evaluation of obstructions. There is also a blind spot for the ultrasonic sensors. In this blind spot objects can no longer be detected. Identifying objects may reach the physical boundaries of ultrasonic measurement if the ultrasonic rays are not or only badly reflected (e.g. with trailer towbars or thin objects). Low-lying obstacles (e.g. tall kerbs) may be displayed and then 'disappear' **before** the continuous alarm is sounded. Loud sound sources outside and inside the vehicle can drown out the PDC signal tone. It therefore remains the driver's responsibility to watch for obstacles, even in vehicles with PDC.

Brief component description

PDC consists of the following components:

- **Ultrasonic sensors**

> E70, E71

8 ultrasonic sensors for SA508: Park Distance Control (PDC), front and rear

> E81, E82, E84, E87, E88, E89, E90, E91, E92, E93

4 ultrasonic sensors for SA507: Park Distance Control (PDC), rear

8 ultrasonic sensors for SA508: Park Distance Control (PDC), front and rear

> R55, R56, R57, R58, R59, R60, R61

4 ultrasonic sensors for SA507: Park Distance Control (PDC), rear

There are 4 ultrasonic sensors in each of the front and rear bumpers.

The ultrasonic sensors emit ultrasonic pulses. These ultrasonic pulses are reflected by obstacles (echo impulses).

The ultrasonic sensors receive and amplify these echo impulses. The amplified echo pulses are then converted into a digital signal. Each ultrasonic sensor has own electronic circuitry, voltage supply and data line to the PDC control unit.[more ...]

Important! Measuring range of ultrasonic sensors

The measuring range of the ultrasonic sensors is between approx. 25 centimetres and a maximum of approx. 250 centimetres. A continuous alarm is emitted at a distance of under approx. 25 centimetres. Dirt contamination, humidity, ice and snow may also trigger a continuous alarm.

Note: Cleaning the ultrasonic sensors

To make sure the system remains fully operational, keep the ultrasonic sensors clean and free from ice. Do not clean by spraying high-pressure washers directly at the ultrasonic sensors. When cleaning, always maintain a minimum distance of at least 10 centimetres.

Note: Make sure the decoupling element on ultrasonic sensor is correctly located.

The respective decoupling element must be correctly located. Otherwise the transmit/receive mode will be impaired.

- **PDC button**



The signal from the PDC button is read by the IHKA (or IHKR/IHR control unit) control unit. In turn, the IHKA control unit sends a signal on the K-CAN.

The PDC button is used to manually switch the Park Distance Control system on and off. When the PDC is switched on, the function LED in the PDC button lights up.

If a fault develops in the PDC, the function LED in the PDC button flashes.

- **PDC control unit**

The PDC control unit controls the ultrasonic sensors for transmitting ultrasonic pulses. The PDC control unit also receives the digital signals from the individual ultrasonic sensors. From the individual digital signals, the PDC control unit calculates the minimum distance between the ultrasonic sensor and the object.

When an object is detected, an acoustic warning and a visual warning are given.

- > E70, E71
[more ...]
- > E81, E82, E84, E87, E88, E89, E90, E91, E92, E93
[more ...]
- > R55, R56, R57, R58, R59, R60, R61
[more ...]

The PDC control unit is connected to various other control units via the bus system:

- **RAD2, CHAMP, multi-audio system controller or CCC: BMW "Professional" radio, Multimedia Platform, multi-audio system controller or Car Communication Computer**

> E70, E71, E81, E82, E84, E87, E88, E89, E90, E91, E92, E93

Depending on the equipment fitted, the audio master emits acoustic PDC warnings via the mid-range speaker.

- **Radio Wave CD, Radio Boost CD or CCC: Radio Wave CD, Radio Boost CD or Car Communication Computer**

> R55, R56, R57, R58, R59, R60, R61

Depending on the equipment fitted, the audio master emits acoustic PDC warnings via the mid-range speaker.

- **CID: Central information display**

> E70, E71, E81, E82, E84, E87, E88, E89, E90, E91, E92, E93

The visual PDC warnings are given in the Central Information Display (CID).

In addition, information regarding a Check-Control message that may be present is shown.

- **KOMBI: Instrument panel control unit**

> E70, E71, E81, E82, E84, E87, E88, E89, E90, E91, E92, E93

A current Check-Control message is indicated by a symbol in the LCD display in the instrument panel. Moreover, the instrument panel also provides the exterior temperature and the kilometre reading for the PDC control unit.

The PDC control unit is then able to correct the calculated distance with a factor corresponding to the ambient temperature.

- **KOMBI and CID: Instrument panel and Central Information Display**

> R55, R56, R57, R58, R59, R60, R61

The instrument panel has two sections. The actual instrument panel is in the centre of the dashboard. The auxiliary instrument is on the steering column.

The KOMBI and the CID are both control units. These control units are plugged into one another and installed together in the dashboard.

All equipment specifications are connected to the auxiliary instrument via a K-bus. The auxiliary instrument is the gateway to the K-CAN.



A current Check-Control message is indicated by a symbol in the LCD display in the auxiliary instrument.

The instrument panel provides the ambient temperature and the kilometre reading for the PDC control unit. The PDC control unit is then able to correct the calculated distance with a factor corresponding to the ambient temperature.

- **EGS: Electronic transmission control**

On vehicles with automatic transmission, the electronic transmission control (ESG) supplies the signal that reverse gear is engaged.

The PDC control unit activates PDC after a short delay (approx. 1 second). This prevents PDC from being unexpectedly activated on vehicles with automatic transmission, for example when the selector lever is moved from "P" to "N" via "R".

- **: Dynamic stability control**

The DSC control unit supplies the PDC with information about the driving speed and distance travelled.

- **FRM: Footwell module**

On vehicles with manual transmission, the footwell module (FRM) supplies the signal that reverse gear is engaged.

- **CAS: Car Access System**

The CAS control unit supplies the PDC with the terminal status (e.g. terminal 15).

- **AHM: Trailer module**

The trailer module (AHM) sends a signal indicating whether the vehicle is towing a trailer or if a rear carrier rack is fitted. If a trailer or rear carrier rack is recognised, the acoustic and visual warnings for the rear bumper are deactivated.

System functions

PDC incorporates the following functions:

- Acoustic warnings
- Visual warning with multi-audio system controller and Car Communication Computer
- Check Control
- System limits

Acoustic warning

The acoustic warnings are emitted by:

> E70, E71

- Mid-range speaker with CHAMP, M-ASK or CCC

If an object is detected by 2 ultrasonic sensors, the speaker closest to the object is actuated. The mid-range speakers can be actuated. (depending on the vehicle type concerned, the mid-range speakers in the left/right front doors or left/right rear doors are actuated, for example)

If an object is detected by the central ultrasonic sensors, the mid-range speakers on the left and right-hand sides are actuated together.



> E81, E82, E84, E87, E88, E89, E90, E91, E92, E93

- 2 acoustic sensors (1 front, 1 rear) with radio without audio system

The PDC control unit directly actuates the acoustic sensors (front/rear in passenger compartment). Within the acoustic sensor, the control signal is transformed to approx. 48 volts. This voltage excites a piezo-ceramic element that together with the resonator (housing) generates a warning tone.

Up to 09/2006, the tone is in the frequency range of approximately 1 kHz.

From 09/2006 the tone is in the frequency range of approximately 1.5 kHz (front) or 1.0 kHz (rear).

- Mid-range speaker with RAD 2, M-ASK or CCC

If an object is detected by 2 ultrasonic sensors, the speaker closest to the object is actuated.

The mid-range speakers can be actuated. (e.g. the mid-range speakers in the front doors, left/right, in the storage shelf, left/right, in the rear doors, left/right, in the storage shelf, left/right or in the rear side trim panel, left/right are actuated, depending on the vehicle type.)

If an object is detected by the central ultrasonic sensors, the mid-range speakers on the left and right-hand sides are actuated together.

> R55, R56, R57, R58, R59, R60, R61

- 1 acoustic sensor (rear) with Radio Wave

The PDC control unit directly actuates the acoustic sensors (in rear of passenger compartment). Within the acoustic sensor, the control signal is transformed to approx. 48 volts. This voltage excites a piezo-ceramic element that together with the resonator (housing) generates a warning tone. The tone is in the frequency range of approximately 1 kHz.

- Mid-range speakers with Radio Wave CD, Radio Boost CD or CCC

If an object is detected by 2 ultrasonic sensors, the speaker closest to the object is actuated. The mid-range speaker on the left/right can be actuated.

If an object is detected by the central ultrasonic sensors, the mid-range speakers on the left and right-hand sides are actuated together.

The distance to the object determines the tone sequence for the acoustic warning (the smaller the distance, the faster the tone sequence).

A distance of less than approx. 25 centimetres is indicated by a continuous tone. The continuous alarm is emitted alternately from the front and the rear.

If the vehicle moves away from the object, the warning tone will be cancelled when the distance increases by more than 10 centimetres.

Detection range for acoustic warnings:

- approx. 60 centimetres for the ultrasonic sensors at the two corners of the front bumper
- approx. 70 centimetres for the two middle ultrasonic sensors in the front bumper
- approx. 60 centimetres for the ultrasonic sensors at the two corners of the rear bumper
- approx. 150 centimetres for the two middle ultrasonic sensors in the rear bumper



Optical warning with multimedia platform or multi audio system controller or Car Communication Computer

The visual PDC warnings are given in the Central Information Display (CID). This is subject to the PDC display in the CID being active.

The visual warnings are given earlier than the acoustic warnings.

The effective detection range is approx. 2.5 metres at the front and rear.

The schematic diagram is shown on the CID. The PDC control unit supplies the distance between the ultrasonic sensor and the object detected via the K-CAN.

The PDC picture on the CID is an overhead view of the vehicle with the detection range of the ultrasonic sensors.

The distance to objects detected is shown in the colours of traffic lights:

- Distance between 200 (250) and 101 centimetres: green
- Distance between 100 and 51 centimetres: yellow
- Distance less than 50 centimetres: Red

The PDC display appears as soon as the PDC is switched on (manually or automatically). The PDC display overrides other displays in the CID. When the PDC is switched off again, the previous display automatically appears again in the Central Information Display.

Check Control

If a fault should develop in the PDC, the function LED in the PDC button will flash with a frequency of 2 Hz.

In this situation, PDC cannot be switched on.

At the same time, a Check-Control message is displayed in the following form

- Symbol in the LCD display in the instrument panel
- The following text appears in the status line of the Central Information Display:

"PDC failure!"

In the menu "BMW Service", the following text can be called up in the submenu "Check-Control messages":

"Park Distance Control

No acoustic warning available for Park Distance Control PDC.

Have the problem checked by BMW Service as soon as possible."

If a fault entry is recorded, the kilometre reading and the ambient temperature are recorded along with the type of fault.

System limits

Important! The driver remains responsible at all times

PDC cannot substitute the driver's personal evaluation of obstructions. There is also a blind spot for the ultrasonic sensors. In this blind spot objects can no longer be detected. Identifying objects may reach the physical boundaries of ultrasonic measurement if the ultrasonic rays are not or only badly reflected (e.g. with trailer towbars or thin objects). Low-lying obstacles (e.g. tall kerbs) may be displayed and then 'disappear' **before** the continuous alarm is sounded. Loud sound sources outside and inside the vehicle can drown out the PDC signal tone. It therefore remains the driver's responsibility to watch for obstacles, even in vehicles with PDC.



During operation, the following system functions, which require explanation, can occur due to the limits of the functional range (for the driver):

- Under the following conditions, it could happen that the PDC gives a warning, even though there is no obstacle within the effective detection range:
 - Ultrasonic sensor incorrectly located in its bracket
 - Heavy rainfall
 - Ultrasonic sensors covered in snow
 - Exhaust gases
 - Echo impulses caused by ground, e.g. extremely coarse road surface or high grass
 - Very smooth walls in large, enclosed, rectangular spaces, e.g. in underground car parks (interference from previously reflected echo impulses)
 - Protective cap for trailer coupling ball head incorrectly seated or objects being transported protruding into the effective detection range of the ultrasonic sensors.
- Under the following conditions, the PDC may not recognise an obstacle that is present:
 - Objects close to the ground (no reflection)
 - Objects with corners and sharp edges (no reflection)
 - If you drive alongside a wall for more than 3 seconds, the acoustic warning will be deactivated. Here, the distance must be greater than the effective detection range for the continuous alarm (approx. 25 centimetres). As soon as the distance drops below 25 centimetres, the continuous alarm will sound again.
 - If the vehicle approaches an object too fast
 - Starting up and moving away too quickly while PDC is starting

Conditions for switching on and off

PDC is switched on under the following conditions:

- PDC button is pressed (PDC switched on manually), only option SA508
- Reverse gear engaged (PDC switched on automatically)

PDC is switched off under the following conditions:

- Reverse gear disengaged, only option SA507
- PDC button is pressed (PDC switched off manually), only option SA508
- Ignition switched off (PDC switched off automatically)
- After driving approx. 50 meters
- After exceeding a speed of 30 km/h

When towing a trailer or using a rear carrier, the acoustic and visual warning for the rear bumper is switched off via the trailer module (AHM). The trailer or rear carrier rack must be electrically connected for this purpose.

Operation

The visual warning (PDC display) is switched on in the Central Information Display (CID) as follows:

- "Settings (i)" menu
- "Vehicle settings" menu
- "PDC" menu
- Activate "Display on"

Notes for Service department

The following information is available for service staff:

- General information: [more ...]
- Diagnosis: ---
- Encoding/programming: ---

Japanese market version

An acoustic signal (reversing gong) is output by the acoustic generator or the mid-range speaker as long as reverse gear is engaged. The reversing gong is immediately switched off when the PDC recognises an object



in the detection range and an acoustic warning is triggered.

We can assume no liability for printing errors or inaccuracies in this document and reserve the right to introduce technical modifications at any time.



65 06 04 (101)

Radio

E87, E90, E91, E92, R56



Introduction

There are several different radio stages for the BMW 1-Series, the BMW 3-Series and the MINI.

> E87

The BMW 1-Series is also available without a radio. If it is supplied without a radio, it does not feature a radio wiring harness.

The following options are available for the BMW 1-Series:

- Option 667 BMW "Audio" radio (without drive)
- Option 662 BMW "Business CD" radio (with CD drive)
- Option 663 BMW "Professional" radio (with CD drive)
- Option 651 "MD drive", only in conjunction with option 663 BMW "Professional" radio

> E90, E91, E92

The BMW 3-Series is equipped with the BMW "Business CD" radio, even in its basic equipment version. The US version even has the BMW "Professional" radio. All other options available for the BMW 1-Series are also available for the 3-Series.

> R56

The R56 is equipped with the MINI "Wave" radio in the basic equipment level.

The following options are available for the R56:

- Option 6FB MINI "Wave CD" radio (with CD drive)
- Option 6FC MINI "Boost CD" radio (with CD drive)

A MOST bus is provided from the BMW "Professional" or MINI "Boost CD" radio upwards. The radio is the data interface (gateway) between the MOST bus and the K-CAN.



> E87, E90, E91, E92: [System overview ...]

> R56: [System overview ...]

Brief description of components

The radios comprise the following components:

- **Radio**

The tuner is able to receive AM and FM stations. The tuner also receives additional information such as RDS (Radio Data System).

> E87, E90, E91, E92

[more ...]

> R56

[more ...]

- **Amplifier**

Amplifiers are integrated in the radios. The stereo audio system can be operated with these amplifiers. For the HiFi and Top-HiFi audio systems, external amplifiers are used.

[more ...]

- **Audio systems**

Various audio systems can be combined with the radios.

> E87, E90, E91, E92

[more ...]

> R56

[more ...]

The radios receive signals from the following components:

- **Aerials**

Most aerials are integrated in the rod aerial, roof-mounted aerial, side window (rear) and in the rear window.

[for further information, please refer to SI Technology (SBT) 65 02 05 114]

- **AUX-In connection**

An external audio device can be connected to the AUX-In connection (e.g. an MP3 player)

- **Telephone**

The telephone supplies the signal to switch the radio to mute. The telephone also sends the low-frequency output signal to output calls via the loudspeaker. The signals are transmitted directly. From BMW "Professional" or MINI "Boost CD" radio upwards, signals can be transmitted through the MOST.

- **CD changer**

> E87, E90, E91, E92: from BMW "Professional" radio

The CD changer supplies low-frequency output signals via the MOST for activating the output stages.

> R56: from MINI "Boost CD" radio

The CD changer on the R56 does not need a magazine. Up to 6 CDs can be fed in turn into the slot of the CD changer (please refer to the Owner's Handbook).

The CD drive is able to play standard audio CDs or CDs with compressed audio data (MP3/WMA). WMA (Windows Media Audio) is a compression standard, like MP3 (MPEG Layer 3, i.e. Moving Pictures Expert Group).

- **DSC: Dynamic Stability Control**

The Dynamic Stability Control control unit sends a road speed signal. This signal is used to control speed-dependent volume control.

- **SZL: Steering column switch cluster**

The steering column switch cluster supplies the signals for the multi-function steering wheel (MFL). The information is sent on the K-CAN and processed by the radio.



- **KOMBI: Instrument cluster**

> E87, E90, E91, E92

The instrument cluster is the unit master in the vehicle. The time, external temperature and consumption values, for example, are sent to the radio.

These settings can also be made via the radio with the BMW "Professional" radio and higher.

> R56

On the R56, the time, outside temperature and fuel consumption data (for example) are transmitted by the auxiliary instrument (KOMBI2) to the K-CAN.

Depending on the equipment fitted, the instrument cluster (KOMBI) may have recesses for:

- Radio control panel
- Central Information Display (CID) on vehicles with Car Communication Computer (CCC)

The radios output the following signals via the loudspeakers:

For all radios:

- **Audio signals**

From BMW "Professional" or MINI "Boost CD" radio:

- **Park Distance Control (PDC)**
- **Acoustic warnings (e.g. acoustic signals)**

System functions

BMW "Audio"/MINI "Wave" radio

BMW "Business CD"/MINI "Wave CD" radio

These radios are almost identical in their functions and construction. They are operated in the same way as radios that have featured in other models, such as the E46.

The radios do not have a digital sound processor (DSP) to generate sound. Therefore, they do not support signal generation as is necessary for the Park Distance Control System (PDC), for example. The signal tones in this case are generated by the corresponding control units themselves.

BMW "Professional" / MINI "Boost CD" radio

The BMW "Professional" radio and MINI "Boost CD" radio are radios for the MOST network.

The CD drive can play both standard audio CDs and CDs with compressed audio data (MP3/WMA).

The BMW "Professional" radio and MINI "Boost CD" radio have the following functions:

Gateway

The radio forms the interface for data exchange between the MOST bus and the K-CAN. The two bus systems use different data transmission rates and data formats. In order to communicate with both systems, the data from one bus is converted to a compatible format for the other in the radio.

- **System master**

The system master links the individual control units.

- **Power master**

The power master initialises the network and switches the buses on and off (wake-up, sleep mode).

- **Network master**

The network master controls and monitors the MOST bus. Each time the network is started up, the system configurations are detected and compared with a stored specified configuration. If systems do not work correctly, these are reset and separated from the MOST bus. Each error or deviation from the specified configuration is saved in a fault memory for the MOST bus.



Audio system controller

- Audio master

The audio master collects, evaluates and controls all audio signals in the vehicle. The audio master outputs the signals in order of priority via the loudspeakers. The audio master also produces additional audible signals for warnings and for Park Distance Control (PDC). By mixing or fading in and out, a "softer" audible change is obtained between the signal sources.

- Connection master

The connection master distributes the signals of the audio sources and the audible signals to the loudspeakers. The connections to digital audio sources are made, disconnected and enabled by the connection master.

The signals are transmitted to the loudspeakers in the following way:

- Front left and right:
Acoustic signals, telephone
- Front and rear: Signals from Park Distance Control (PDC)
- All loudspeakers: All sources in the "Entertainment" menu, traffic reports

Notes for service staff

Service staff should note the following points:

- General note: [more ...]
- Diagnosis: ---
- Encoding/programming: ---

Subject to change.



00 00 ... Battery: checking display (magic eye), recharging battery if necessary

If a battery is replaced, it is absolutely essential to choose a replacement battery of the same capacity/size from the Parts Catalogue. Lead-calcium batteries may only be replaced by another lead-calcium battery or an AGM battery.

Note:

Read and comply with the warning notices and explanations printed on the battery.

Poorly charged batteries are susceptible to freezing.

Flat batteries incur preliminary damage if the open-circuit voltage is less than 12.0 V. This can cause premature failure.

Storage temperatures above 35 °C speed up the rate at which a battery will self-discharge.

If electrical loads/consumers in the car are switched on in the course of maintenance or service-inspection work, this current drain must be compensated for by connecting a BMW-approved charger.

During each service-inspection or battery check, observe the colour of the hydrometer and proceed as follows:

Green = Battery sufficiently charged
(no action necessary)

Black = Battery insufficiently charged
(charge battery fully)

Bright yellow = Acid level too low
(replace battery)

Checking battery:

A fully charged, as-new battery has a voltage of at least 12.7 V.

Depending on the battery voltage, proceed as follows:

- If the battery voltage is over 12.3 V, no further action is necessary.
- If the battery voltage is between 12.0 and 12.3 V, charge the battery for at least 12 hours.
- If the battery voltage is below 12.0 V, the battery has incurred preliminary damage and must be replaced.

On a battery which has been stored, the colour of the hydrometer (the so-called "magic eye") can remain black although the battery has an open-circuit voltage value of at least 12.7 V. This is caused by acid lamination in the battery. Such batteries are nevertheless fully charged and OK.

To eliminate acid lamination, slowly turn the affected battery over once. This causes the magic eye to show "green" again.

It is necessary to wait at least 6 hours to be able to correctly determine the open-circuit voltage. Only after this period has elapsed should you proceed to ensure that possible surface charges which could distort the measured voltage value are eliminated.



00 00 ... Brake lines and connections: visual inspection for leaks, damage, attachment and correct position

Check brake lines and connections

- Visual inspection in visible area for:
 - Check brake fluid level in expansion tank
 - leaks
 - traces of fluid
 - damage
 - pinched areas
 - correct routing of brake lines
 - correct seating of brake lines in holders

Note:

Detected faults must urgently be repaired after consultation with the customer!



00 00 ... CBS reset

The CBS service jobs can be reset in the car with the on-board computer button on the direction indicator/main-beam switch. It is only possible to code the statutory intervals specific to individual countries with the diagnosis system. It is always recommended to reset the CBS jobs via the diagnosis system.

Resetting service-relevant jobs

CBS reset in the car

Note: First carry out the service measure.

Resetting of a service job must always be carried out **after** the service measure has been completed.

Note: Perform reset according to instructions.

The resetting procedure is aborted by a timeout or a terminal change.

The service jobs can be reset in the car at the instrument cluster. Here, the availability of a service job is set to 100 % again (corresponding to a new part).

The availability is an internal computing value (not visible to the user).

Observe the following procedure when resetting with the trip odometer reset button:

- Switch on terminal 15.
- Press the trip odometer reset button for approx. 10 seconds until the 1st service job appears in the LC display.
- The upper display in the speedometer is illuminated by a service symbol (e.g.: an oil can denotes an oil change).
The lower display in the speedometer indicates the time or distance remaining until the next service (e.g.: 14000).
Press the on-board computer button repeatedly to scroll.
- To reset, press and hold the on-board computer button on the direction indicator/main-beam switch until "RESET" appears in the lower display.
- Pressing the on-board computer button again resets the service shown in the upper display.
- Repeat the procedure for each additional service which is to be reset.

Note: Resetting increases the service counter.

Each reset increases the service counter of the respective job by 1. The service counter is used in the SAM on a job-specific basis to control additional tasks.

Note: Sorting is chronological.

The service jobs are sorted in chronological order. The most critical job is displayed first.

Note: Vehicle inspection and exhaust emission test are country-specific.

The statutory intervals specific to individual countries are coded with the diagnosis system.

CBS reset with diagnosis system

- The CBS jobs can be reset via the diagnosis system on the following path:
 - => Diagnosis
 - => Function selection
 - => Service functions
 - => Maintenance
 - => CBS reset
- The individual CBS items are displayed in the BMW diagnosis system with service counter and availability.



- The service counter is increased by 1 during the reset. All service counters are set to "1" on new vehicles.
- Availability is set to 100 % during the reset. It is basically a display quantity indicating the wear level of the job. The greater the availability, the more distant is the next service appointment. 0 % means that the service item must be carried out.

Important:

- To be able to check and/or correct the car's on-board date properly, the diagnosis system requires the correctly set tester system date!
- The jobs may only be reset after the service measure has been completed.
- The brake pads can only be reset with a new brake pad wear sensor.



00 00 ... Check coolant level, if topping up: checking concentration

Check coolant level in expansion tank. Coolant level must be between Min. and Max. marks. If necessary, top up coolant to max. fill level. If there is no coolant, also identify the cause and notify the customer.

Check concentration with antifreeze tester in coolant expansion tank.

If necessary, drain the differential amount at the coolant drain plug and top up with recommended coolant.



00 00 ... Check windscreen wash/wipe system

- Check wipe pattern for smearing; if necessary, replace wiper blades after consulting with customer
- The spray jet must emerge uniformly from the spray nozzle, replace nozzle if necessary and issue a separate invoice



**00 00 ...
system**

Checking horn, headlight flashers and hazard warning

Horn

Check function.

Note:

In the case of twin-tone fanfares, make sure that both fanfares are working properly.

Headlight flasher

Activate headlight flashers, check high-beam headlights and blue indicator lamp in instrument cluster for correct operation.

Hazard warning system

Check function.

Note:

After consultation with the customer, rectify faults and issue a separate invoice.



00 00 ... Checking instrument/inscription lighting, interior/luggage compartment/glove box lights and blower

Instrument lighting

Check function of instrument and indicator/warning lights.

Inscription lighting

Check function of light switches; dimmer; controls; heater/air conditioning; rear window demister; radio; (depending on equipment) on-board computer; power windows; electric slide/tilt sunroof; fog lamp.

Interior lighting, glove box light and luggage compartment lights

Check function of footwell lighting, front and rear reading lights, make-up mirror light, mood lighting (door handles, exit, etc.), glove box light, luggage compartment lights, etc..

Note: Lighting may vary, depending on the equipment specification.

Heating

Check function of all blower stages, air distribution and air outlet.

Note

After consultation with the customer, rectify faults and issue a separate invoice.



00 00 ... **Checking lighting system**

- Check lighting system for correct operation:
 - Check headlights, rear lights and associated indicator lights
 - Check headlight adjustment
 - Check side lights, parking lights, low-beam headlight and high-beam headlight for correct operation
 - Check headlight flasher for correct operation
 - Check left/right turn indicators and hazard warning flashers for correct operation
 - Check brake lights for correct operation
 - Check reversing lights and number plate lights for correct operation
 - Check front and rear fog lights for correct operation
 - If necessary ground lights of outside door handles



00 00 ... **Checking of road safety (test drive)**

- **Checking of road safety**
 - Take vehicle for a test drive, checking service and parking brakes in the process
 - Check steering for play, ease of movement and directional stability
 - Check clutch for problem-free disengagement and non-spasmodic driving off at normal operating temperature
 - Visually inspect shock absorbers for leaks
 - Check indicator/warning lamps and Check Control system for correct operation
 - Check due date for statutory roadworthiness and exhaust emission tests and advise customer of test dates



**Important!**

It is essential to adhere to the exact capacities specified.

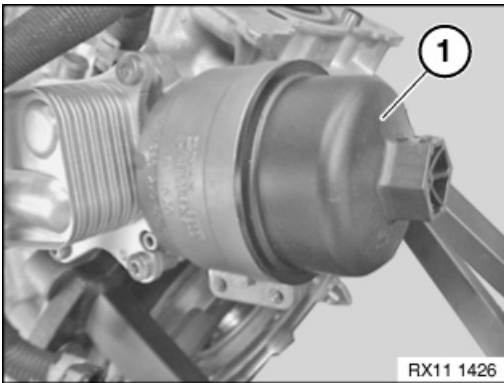
Overfilling the engine with engine oil will result in **engine damage**.

Checking and drip-off times must be observed.

**Recycling:**

Catch and dispose of used oil in a suitable container.

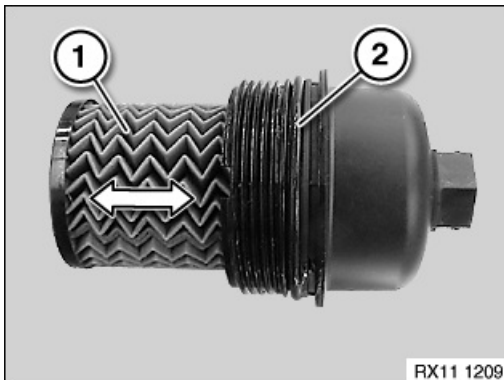
Observe country-specific waste disposal regulations.



Release oil filter cover (1) at hexagon head. *Note:*

Slowly open oil filter cover.

If necessary, catch escaping engine oil in a cloth.



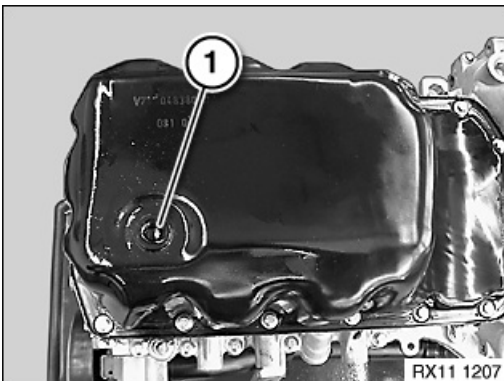
Remove and insert oil filter element (1) in direction of arrow.

Replace O-ring (2).

Installation note:

Apply thin coat of engine oil to all O-rings (2).

Tightening torque: 11 42 1AZ.



Remove oil drain plug (1). *Installation note:*

Replace sealing ring.

Tightening torque: 11 13 1AZ





Assemble engine.

Pour in engine oil.

Checking engine oil level:

- Vehicle must be parked horizontally.



11 00 ... Engine oil service (N18)



Warning!

Risk of scalding!

Coolant temperature must not exceed 60°.

In the event of excess temperature, the engine must cool down.



Attention!

The cooling system must be depressurised for safety reasons.

Open radiator cap wearing suitable protective clothing.

It is essential to adhere to the exact capacities specified.

Overfilling the engine with engine oil will result in **engine damage**.

Test period and drip-off time must be observed.



Necessary preliminary work:

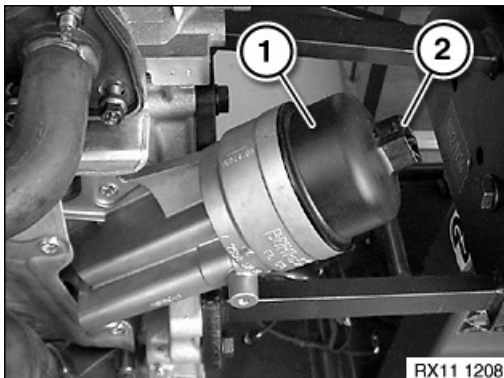
- Release coolant expansion tank and place to one side



Recycling:

Catch and dispose of used oil in a suitable collecting vessel.

Observe country-specific waste disposal regulations.



Undo oil filter cover (1) at hexagon head (2). *Note:*

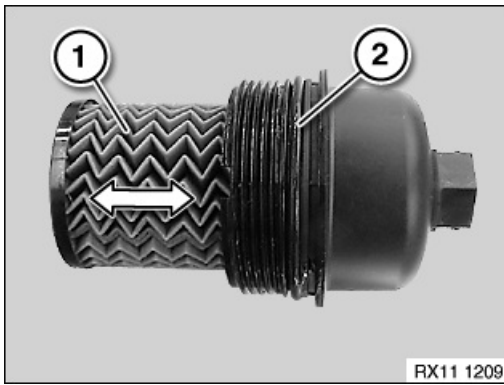
Slowly open oil filter cover.

If necessary, catch escaping engine oil in a cloth.



Check the freedom of movement of the non-return valve (1).





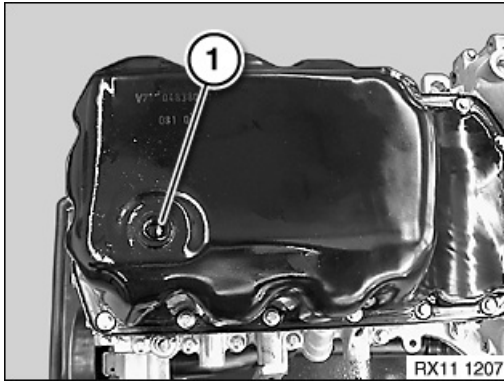
Remove and insert oil filter element (1) in direction of arrow.

Replace O-ring (2).

Installation note:

Apply thin coat of engine oil to O-ring (2).

Tightening torque: 11 42 1AZ.



Remove oil drain plug (1). *Installation note:*

Renew the sealing ring.

Tightening torque: 11 13 1AZ



Assemble engine.

Checking engine oil level:

- Park vehicle on a horizontal surface.



00 00 265 MINI quick inspection

1 Carry out a quick inspection



NOTICE

A checklist can be printed off for quick inspection. See Additional Information.

- Print out document.
- Work through check list.
- Hand over the checklist to the customer.

Additional Information

Links

Technical service information	Used in step
BMW quick inspection	1
BMW i quick inspection	1
MINI quick inspection	1



00 00 009 **Pre-delivery check**

Quality assurance by MINI Service

Model:
Vehicle identification number:

- Included with the vehicle:
- Owner's Handbook(s)

Service Booklet

Vehicle key/remote key

If necessary - spare key

I hereby confirm that I have received the vehicle in perfect condition.

.....

Place and date Signature of vehicle owner

Pre-delivery check by MINI Service

Scopes of inspection: To be kept with the workshop documents

The following work must be carried out on the vehicle by BMW Service prior to delivery.

*** Denotes optional extra or national-market version. Observe possible changes in this regard.**

Model:
Vehicle identification number:

Accessory items	Not OK	OK



Install	O	O
Tighten rod aerial to limit position. Check correct installation.	O	O
Using diagnosis system	Not OK	OK
Carry out "CBS pre-delivery check" in the Service Function path under Maintenance	O	O
Deactivate transportation mode	O	O
Reset average mileage/kilometres driven	O	O
Enter first registration	O	O
Set on-board date	O	O
Set statutory inspection dates*	O	O
Enter Service telephone number	O	O
Navigation system*: Activate the roadmap. Check the up-to-dateness of the roadmap and update if necessary.	O	O
Check battery, observe notes in tester, charge battery if necessary	O	O
Delete fault memory	O	O
Carry out brief diagnosis test, eliminate faults if necessary	O	O
Engine compartment	Not OK	OK
Check for cleanliness	O	O
Check battery compartment cover for tight fit.	O	O
Fluid tank for washer fluid	Not OK	OK
Check fluid level and top up if necessary, where required with antifreeze additive	O	O
Labels	Not OK	OK
Apply label for BMW Mobile Service	O	O
Coilover suspension (John Cooper Works GP2 only)	Not OK	OK
Clean and grease threads of spring struts (Staburags lubricant, part number 07 55 9 056 992)	O	O
Set coilover suspension to normal position with setting gauge (setting tool is located in the toolkit in the luggage compartment)	O	O
Body, interior equipment, underbody	Not OK	OK
Check for transportation damage	O	O
Protective transportation splints for wiper blades*	Not OK	OK
Remove protective transportation splints	O	O



Spring blocker*	Not OK	OK
Remove spring blocker	<input type="radio"/>	<input type="radio"/>
Tyres	Not OK	OK
Check tyre pressures; if provided, also compact or spare wheel	<input type="radio"/>	<input type="radio"/>
Observe the information on tolerance compensation for RDC.		
Initialise Run Flat Indicator or tyre pressure control	<input type="radio"/>	<input type="radio"/>
Winter tyres*	Not OK	OK
Attach V-max. label	<input type="radio"/>	<input type="radio"/>
Service Booklet	Not OK	OK
Stamp pre-delivery check	<input type="radio"/>	<input type="radio"/>
Include documents or hand them over with the vehicle	Not OK	OK
Rider's Manual	<input type="radio"/>	<input type="radio"/>
Service Booklet	<input type="radio"/>	<input type="radio"/>
Booklet, contact	<input type="radio"/>	<input type="radio"/>
Care/Upkeep booklet	<input type="radio"/>	<input type="radio"/>
Booklet, BMW Mobile Service	<input type="radio"/>	<input type="radio"/>
Include MINI ignition key/remote control (make note of quantity)	<input type="radio"/>	<input type="radio"/>
Indicator/warning lights and Check Control	Not OK	OK
Check for faults and eliminate faults if necessary	<input type="radio"/>	<input type="radio"/>
Service and parking brake	Not OK	OK
Transport and immobilisation periods of 3-6 weeks:	<input type="radio"/>	<input type="radio"/>
Check for correct operation		
In event of transportation and immobilisation periods of more than 6 weeks:	<input type="radio"/>	<input type="radio"/>
Brake in		
Interior mirror with digital compass*	Not OK	OK
Calibrate system	<input type="radio"/>	<input type="radio"/>



Transportation lock* and vehicle cleaningNot
OK

OK

Remove the protective transportation film

O

O

Clean inside and outside of vehicle

O

O

Date

Mechanic

Workshop Supervisor



00 00 ... Seat belts: Check condition of seat belt strap, check function of automatic reel, seat belt locking reel, seat belt buckle, seat belt clip and, if necessary, seat belt clasp

Seat belt strap, automatic reel, seat belt locking reel

Pull out seat belt strap and make sure it emerges without jerking.

Check seat belt strap for damage:

- folding
- unravelling
- pinches
- cracks and tears
- traces of melting

Check the seat belt clip (retaining button) and, if necessary, seat belt clasp of belt tongue on seat belt strap for damage and installation.

Retract seat belt strap; here the automatic reel must retract the seat belt strap automatically and without squeaking noises; the last section of the strap may have to be fed in.

Pull out seat belt strap in short tugs - seat belt locking reel must lock.

Seat belt buckle

The belt tongue on the seat belt strap must easily snap into place with an audible click.

When the "Press" button is pressed, the belt tongue must be ejected from the buckle under spring pressure.

Note:

If the seat belt is damaged, you must replace the seat belt completely after consulting the customer; issue a separate invoice for this work.

Instructions on how to proceed, refer to Checking automatic seat belt.



00 00 602 **Service - air filter element**

- **Service - air filter element**
 - Replace air filter element
Shorten change intervals for vehicles operated in dusty regions.



00 00 618 **Service - brake fluid**

- **Service - brake fluid**
 - Change brake fluid
 - Reset CBS display according to factory specification

Important!

Read and comply with general notes and information on brakes



00 00 618 **Service - brake fluid**

- **Service - brake fluid**
 - Change brake fluid
 - Reset CBS display according to factory specification

Important!

Read and comply with general notes and information on brakes



00 00 618 **Service - brake fluid**

- **Service - brake fluid**
 - Change brake fluid
 - Replace microfilter for interior blower.
 - Reset CBS display according to factory specification

Important!

Read and comply with general notes and information on brakes



00 00 610 Service - engine oil

- Renew engine oil and oil filter
- Reset CBS display according to factory specification

Important!

The job items specified below always pertain to the maximum possible scope of an engine oil service. These job items are coupled to the engine oil service. The multipliers refer to the ECE standard intervals. Country specific deviations may apply.

The linked job items are not included in the engine oil service. Invoicing is separate from the engine oil service.

The change interval (motor oil change multiplier) can be taken from the following matrix: The vehicle-specific scope must be read out via ISPA (Key Reader) and printed out.

Component:	Microfilter	Air filter	Spark plugs	Fuel filter
Series/version	Multiplier Engine oil change	Multiplier Engine oil change	Multiplier Engine oil change	Multiplier Engine oil change
R55, R56, R57, R58, R59, R60, R61 Petrol/gasoline	1 (approx. 30 tkm)	2 (approx. 60 tkm)	2 (approx. 60 tkm)	---
R55, R56, R57 Diesel (W16) up to 08/2010	2 (approx. 40 tkm)	3 (approx. 60 tkm)	---	3 (approx. 60 tkm)
R55, R56, R57, R58, R59, R60, R61 Diesel (N47) from 08/2010	1 (approx. 30 tkm)	2 (approx. 60 tkm)	---	2 (approx. 60 tkm)
R5x JCW, R6x JCW (with engine N14 and N18)	1 (approx. 30 tkm)	2 (approx. 60 tkm)	1 (approx. 30 tkm)	---

- Renew microfilter
- Replace air filter element
- **Petrol vehicles only:**
Replace spark plugs
- **Diesel vehicles only:**
Replace fuel filter



00 00 610 Service - engine oil

- Renew engine oil and oil filter
- **For vehicles from model year 2013:**
At every 2nd engine oil change: Replace battery in radio remote control
- Reset CBS display according to factory specification

Important!

The job items specified below always refer to the maximum possible scope of the engine_oil_service. These job items are coupled to the engine oil service. The multipliers refer to the US standard intervals. Country specific deviations may apply.

The linked job items are not included in the engine oil service. Invoicing is separate from the engine oil service.

The change interval (motor oil change multiplier) can be taken from the following matrix: The vehicle-specific scope must be read out via ISPA (KeyReader) and printed out.

Component:	Microfilter	Air filter	Spark plugs	JCW spark plugs
Series/version	Multiplier	Multiplier	Multiplier	Multiplier
	Engine oil change	Engine oil change	Engine oil change	Engine oil change
R55, R56, R57, R58, R59, R60 up to 03/2012	---	3 (approx. 45,000 mi)	4 (approx. 60,000 mi)	2 (approx. 30,000 mi)
R55, R56, R57, R58, R59, R60, R61 up to 07/2013	---	5 (approx. 50,000 mi)	6 (approx. 60,000 mi)	3 (approx. 30,000 mi)
R55, R56, R57, R58, R59, R60, R61 from 07/2013	2 (approx. 20,000 mi)	5 (approx. 50,000 mi)	6 (approx. 60,000 mi)	3 (approx. 30,000 mi)

- **On vehicles from 07/2013:**
Renew microfilter
- Replace air filter element
- Replace spark plugs



00 00 612 **Service - front brakes**

- **Service - front brakes**
 - Change brake pads,
 - Replace the brake pad wear sensor
 - Clean brake air ducts
 - Apply a thin coating of grease to wheel centring on light alloy wheels
 - Brake discs
 - Check surface and thickness
 - If necessary: Replace
 - Reset CBS display according to factory specification

Note:

- Replace brake discs if they are below the minimum brake disc thickness and if scoring, heat cracks or thickness difference are detected
- Issue a separate invoice for replacing the brake discs



00 00 616 Service - microfilter

- Service - microfilter
- Replace microfilter for interior ventilation



00 00 614 **Service - rear brakes**

- Removing and installing/replacing brake pads on both rear disc brakes
 - Replace the brake pad wear sensor
 - Clean brake air duct
 - Apply a thin coat of grease to wheel centering on light alloy wheels, refer to Service Information Operating Fluids
- Brake discs
 - Check surface and thickness
 - Replace if necessary
- Function check of parking brake with roller dynamometer
- Reset CBS display according to factory specification

Note:

- Replace brake discs if they are below the minimum brake disc thickness and if scoring, heat cracks or thickness difference are detected
- Issue a separate invoice for replacing the brake discs



00 00 622 Service - spark plugs

For details on how to proceed, refer to repair instructions:

- Replace spark plugs



00 00 624 Service - vehicle check

- **Service - vehicle check**

Passenger compartment:

- Check horn, headlight flashers and hazard warning flashers
- Check instrument and inscription lighting, passenger compartment and glovebox lighting, blower
- Check lighting system: if necessary, charge separately to adjust the headlights, function of front/rear and vehicle number plate lighting
- Seat belts: Condition of seat belt strap, check function of automatic reel, check seat belt locking reel, seat belt buckle, seat belt clip and, if necessary, seat belt clasp for damage
- Check windscreen wiper and washer system for function and setting
- MINI convertible (R57) only:
Trigger rollover protection system via diagnostic interface. **Warning:** open soft top first!
- US version only:
Visually inspect all SRS airbag units for cracks, surface damage and attachment of labels

Rear/tyres:

- Tyres: Check tread depth, tread wear pattern, external condition and tyre pressure, correct if necessary
Observe the information on tolerance compensation for RDC.
- Initialise Run Flat Indicator or tyre pressure control
- Mini Mobility System Check expiry date on sealant bottle, if necessary replace sealant bottle (charged separately)
- Check that warning triangle, high-visibility jacket and first-aid kit are present. Check expiry date on first-aid kit (observe national legislation where applicable).

Engine compartment:

- Check coolant level and concentration, top up if necessary. Inform customer in event of incorrect fluid level and, if necessary, troubleshoot (charged separately).
- Window glass and headlight cleaning system: checking fluid level, topping up if necessary
- Battery: Check display (magic eye), recharge if necessary (charged separately)

Chassis and suspension (John Cooper Works GP2 only):

- At every service - vehicle check
Replace all coil springs and carry out a wheel alignment

Underfloor:

- Brake lines and connections: Check for tightness, damage, mounting and correct position
- Vehicle underbody including all visible parts: Check for damage, correct position, corrosion and tightness
- Steering components: Check for play, damage and wear

Test drive:

- Check for road safety:
 - Brakes
 - Steering
 - Shock Absorbers
 - Transmission
- Reset CBS display according to factory specification



00 00 105 Standard scope of service

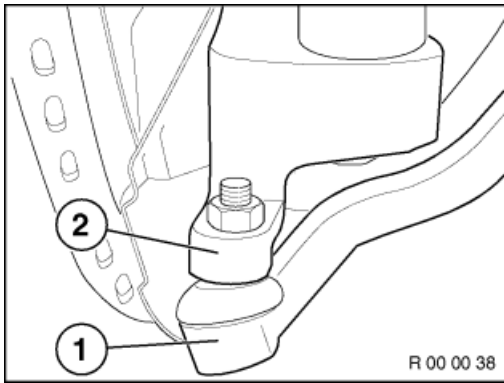
Standard scope of service:

- Function check of parking brake without roller dynamometer
- Check telltale and warning lights
- Check Check Control messages
- For vehicles with slide/tilt sunroof/panorama glass roof:
Check the slide/tilt sunroof guide rails for dirt contamination. Clean if necessary (charged separately).
- Only for John Cooper Works **GP2**:
 - Chassis/suspension components: Check for play, damage and corrosion
 - Clean and regrease threads of spring struts (Staburags lubricant, part number 07 55 9 056 992)
 - Check and, if necessary, adjust threaded chassis to normal position setting using setting gauge

Recommendation:

- Check tyres (incl. compact spare wheel if present):
 - Tread depth
 - Tread wear pattern
 - External condition
 - Check inflation pressure and correct if necessary.
Note the information on tolerance compensation for tyre pressure control (RDC).
- After correction of the tyre pressure: Initialise Run Flat Indicator (RPA) or tyre pressure control (RDC)





Checking play:

- For electrically assisted steering systems, the ignition must be on
- Steering wheel:
Move steering wheel back and forth and check for play
- Tie rod joint:
There must be no clearance between tie rod arm (2) and tie rod joint (1).



Check all visible connections, hoses, lines and steering gear for traces of fluid.

Checking for damage and wear:

Check gaiters, flexible disc and axle and tie rod sleeves for damage (e.g. cracks, holes), for leaks or missing clamping bands on gaiters.



00 00 ... Tyres: checking and if necessary correcting inflation pressure, checking condition, tread depth and pattern

- **Checking tyre pressure:**
 - Check tyre pressure in accordance with label on B-pillar
- **Check tyre condition:**
 - Check tread depth of all tyres with tyre tread gauge
 - Check tyre tread surfaces and side walls for incisions and foreign particles such as nails or screws
 - Check tyre tread pattern for localized flattening and wear on one side; if necessary, carry out wheel/chassis alignment after consulting with customer

Note:

- For details of approved wheel and tyre combinations, refer to KSD CD
- For reasons of driving safety, only use tyres of the same design and tyre tread on a single vehicle
- Inform customer of any incorrect or worn tyres



00 00 ... Underbody incl. all visible components: Check for damage, correct position, tightness, corrosion

- Visually inspect underbody:
 - For leaks (transmission, fuel system, brake components, steering)
 - For correct routing of electrical line (e.g. brake pad wear sensor, pulse sensor)
 - Check tightness of shock absorber, installation and spring corrosion - rebound
 - Damage to underbody
 - Corrosion on underbody
 - Complete mounting of add-on parts (e.g. underbody panelling)

Important!

If damage to the underbody is identified:

- If necessary, remove trim panels from underbody.
- Check brackets as well as brake- and fuel lines for damage and correct installation position.

Rectify identified faults after consulting with customer and issue a separate invoice.



00 00 ... Vehicle care measures for inventory vehicles (new and used vehicles) as well as vehicles to be taken off the road that are in the hands of customers

Action	Vehicles	Execution
Remove the protective transportation film	New vehicles	Do not remove the protective film if the vehicle is kept outdoors; Note the instructions on how to remove protective film
Release parking brake	New vehicles	In general
	Used vehicles	In general
	Customer vehicles to be taken off the road (note to customers)	In general
Engage gear or selector lever position "P" for automatic transmission	New vehicles	In general
	Used vehicles	In general
	Customer vehicles to be taken off the road (note to customers)	In general
Check the covers of the interior equipment	New vehicles	In general
Increase the tyre pressure to 3.5 bar	New vehicles	In general
	Used vehicles	In general
	Customer vehicles to be taken off the road (note to customers)	In general
Charge battery	New vehicles	See battery charging calendar
	Used vehicles	See battery charging calendar



	Customer vehicles to be taken off the road (note to customers)	<p>Every 6 weeks;</p> <p>Every 12 weeks for vehicle batteries that have been disconnected from the vehicle electrical system;</p> <p>Notify customers of vehicle-specific procedures for electric or hybrid vehicles</p>
Change the brake fluid and reset CBS	Used vehicles	Change before vehicle handover to customer if service is due shortly (see CBS display -> Brake fluid service)
Check convertible top for potential damage	New vehicles	Generally before handover to the customer
	Used vehicles	Generally before handover to the customer
If possible, keep convertibles in roofed areas	New vehicles	In general
	Used vehicles	In general
	Customer vehicles to be taken off the road (note to customers)	In general
Check for damage to paint, the exterior or interior	New vehicles	Generally before handover to the customer
	Used vehicles	Generally before handover to the customer
Change engine oil and oil filter at engine operating temperature	New vehicles	No change
	Used vehicles (not applicable to vehicles with Premium Selection certificate)	Prior to handover to customers as from a 12 month immobilisation period
	Customer vehicles to be taken off the road (note to customers)	Prior to handover to customers as from a 12 month immobilisation period



Check coolant composition	Used vehicles	In general
	Customer vehicles to be taken off the road (note to customers)	In general
Dry the parking brake and footbrake by applying the brake	New vehicles	In general
	Used vehicles	In general
	Customer vehicles to be taken off the road (note to customers)	In general
Apply surface protection: vehicle surface wash including interior vehicle cleaning and subsequent paint and chrome-part care. Clean the rubber seals of the flaps and doors and apply talc or rubber care product. Use materials approved by BMW for cleaning and vehicle preservation to recondition engines, engine compartments, vehicle underbodies, axles and assemblies.	Used vehicles	In general
	Customer vehicles to be taken off the road (note to customers)	In general
Switch on the air conditioning for approximately 10 min each month	New vehicles	Required to ensure circulation of the refrigerant oil
	Used vehicles	Required to ensure circulation of the refrigerant oil
	Customer vehicles to be taken off the road (note to customers)	Required to ensure circulation of the refrigerant oil



00 00 ... When driving on a race track

Caution!

The customer must be informed that, in particular, the brake pads, wear indicator and the flat tyre monitor installed as standard are not designed for race track operation. The vehicle is also not designed for motor sport competition racing.

Excessive loading of the vehicle, e.g. by operating it on a race track or in motor sport competition racing, is not covered by the warranty.

If the customer still wants to drive on a race track, the following aspects must be considered/checked, at least:

The vehicle, or rather the engine, should be carefully run in before operating it on the race track. A run in period of at least 2000 km.

Recommendation: Carry out an oil change after the run in period.

For driving on a race track, the following extensions must be considered and implemented on the vehicle.

Model:

Vehicle identification number:

Scope of checks before driving on the race track:		
Vehicle check	OK	Comment
Perform a comprehensive vehicle check service.		
-> Scope of the vehicle check service		
Engine	OK	Comment
Perform oil-level check..		
-> If necessary, top up to the maximum level.		
Transfer box (affects only F39 X2 M35i / F40 M135i xDrive / F54 JCW ALL4 / F60 JCW ALL4)	OK	Comment
Perform transfer box oil change.		
Cooling	OK	Comment
Visual inspection of the radiator for contamination.		
-> Draw off contamination.		
Brake system	OK	Comment
Check the age of the brake fluid - see Service Booklet/Service history.		
-> The age of the brake fluid should not exceed 1 year.		
Check filling level in brake fluid expansion tank.		
-> If necessary, top up to the maximum level.		
Check the brake pad thickness on the front axle.		
-> Wear material thickness ≥ 9 mm		
-> Ideally, install new brake pads.		
Recommendation for M-vehicles: Use Sport brake pads, if available for that model.		



Check the brake pad thickness on the rear axle. -> Wear material thickness \geq rear axle \geq 8 mm -> Ideally, install new brake pads. Recommendation for M-vehicles: Use Sport brake pads, if available for that model.		
Check the brake disc thickness on the front axle. -> Minimum brake disc thickness: \geq Minimum brake disc thickness + 1 mm -> Ideally, install new brake discs.		
Check the brake disc thickness on the rear axle. -> Minimum brake disc thickness: \geq Minimum brake disc thickness + 1 mm -> Ideally, install new brake discs.		
Visual inspection of the brake line and brake hose for tightness, damage and porosity.		
Wheels / tyres	OK	Comment
Check wheels/tyres for suitability for operation on the race track -> Winter tyres, all-season tyres and tyres on steel rims are absolutely unsuitable. Recommendation: Use Sport tyres.		
Check the tyre pressure of all the tyres and adjust, if required. -> In order to increase the service life and tyre performance, a reduction in the tyre pressure is recommended for the race track. To do this, proceed as follows: 1. Drive the tyres warm. 2. Set the tyre pressure according to the prescribed value on the tyre pressure label for partial loads. 3. Initialise RDC. Note: The display of tyre inflation pressure is possible only up to an operating temperature of systems of 120 °C. At higher temperatures, which can be reached during racing operation, the display is suppressed and a CC message is issued. After cooling down, the system functions again without limitations.		
Background: The tyre pressure increases due to the increase in temperature in the tyre when operated on the race track. This reduces the contact surface of the tyre to the road, leading to an increased temperature load on the running surface. The adjustment of the tyre pressure in tyres that have been driven warm as opposed to tyres in a cold state leads to a reduction in the pressure and thus, due to an increased tyre contact area, to a more equal load on the tyre.		

Extensions when driving on a race track:		
Warm up	OK	Comment
Drive a warming up lap. > Bring the engine up to operating temperature. Fast driving at a medium rpm level and medium dynamics.		
Cool down	OK	Comment
Drive a cooling down lap. -> Fast driving at a medium rpm level and medium dynamics. Avoid brake load as far as possible.		

Scope of checks after driving on the race track:		
Engine	OK	Comment
Carry out an oil-level check according to the Owner's Handbook. -> If necessary, top up to the maximum oil level.		



Front axle transmission (only affects G15 with N63 engine)	OK	Comment
Perform oil change on front axle transmission.		
Transfer box (affects only F39 X2 M35i / F40 M135i xDrive / F54 JCW ALL4 / F60 JCW ALL4)	OK	Comment
Perform transfer box oil change.		
Rear axle differential (only affects G29 Z4 M40i / G20 M340i / G20 M340i xDrive)	OK	Comment
If an adjusted rear axle differential is installed. -> Perform oil change.		
Cooling	OK	Comment
Visual inspection of the radiator for contamination. -> Draw off contamination.		
Brake system	OK	Comment
Check filling level in brake fluid expansion tank. -> If necessary, top up to the maximum level.		
Check the brake pad thickness on the front axle. -> Replace brake pads when the remaining brake pad thickness is undershot (min. thickness 3.7 mm)		
Check the dust boots on the brake calipers of the front axle for damage.		
Check the brake pad thickness on the rear axle. -> Replace brake pads when the remaining brake pad thickness is undershot (min. thickness 3.7 mm)		
Check the dust boots on the brake calipers of the rear axle for damage.		
Check the brake disc thickness and their state on the front axle. -> Replace brake discs when: <ul style="list-style-type: none"> • Drop below the minimum brake disc thickness • Scoring • Heat cracks • Thickness difference 		
Check the brake disc thickness and their state on the rear axle. -> Replace brake discs when: <ul style="list-style-type: none"> • Drop below the minimum brake disc thickness • Scoring • Heat cracks • Thickness difference 		
Wheels / tyres	OK	Comment
Note to customer: Perform the following points for wheels/tyres immediately after the racing track operation and before driving on public streets.		
Check wheels/tyres for damage.		
Check wheels/tyres for minimum tread depth.		



Check the tyre pressure of all the tyres and adjust, if required. 1. Allow tyres to cool down. 2. Set the tyre pressure according to the prescribed value on the tyre pressure label. 3. Initialise RDC.		
Background: Adjustment of the tyre pressure in cold tyres, as otherwise it can lead to tyre pressure control warning messages due to the low pressure.		
Vehicle check	OK	Comment
Perform a comprehensive vehicle check service. -> Scope of the vehicle check service		

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Date

Mechanic

Workshop Supervisor



00 00 ... Windscreen washer system: checking fluid level, topping up if necessary

- Top up windscreen washer fluid reservoir, if necessary rear window washer fluid reservoir and (depending on equipment specification) intensive cleaning reservoir up to edge or mark.

Important!

A ph-neutral BMW window cleaning agent (antifreeze in winter) must always be added to the water.



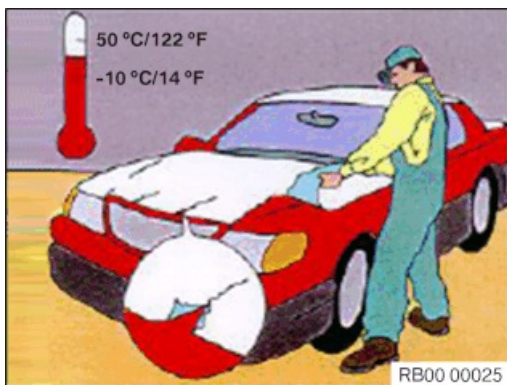
*Note:*

The protective film is applied to new vehicles at the works. The dealer must guarantee only expert removal of the protective film.

The protective film should be removed 48 hours before vehicle handover to the customer.

The protective film can be easily removed from the affected surfaces. Polishing is necessary only in exceptional cases.

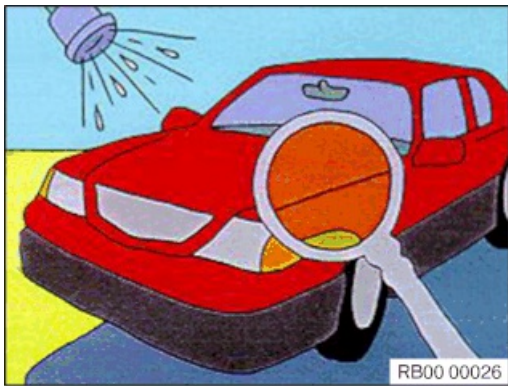
Further information on the protective film is available in the document "Frequently asked questions on surface protection".

**Instructions for removing the protective film:**

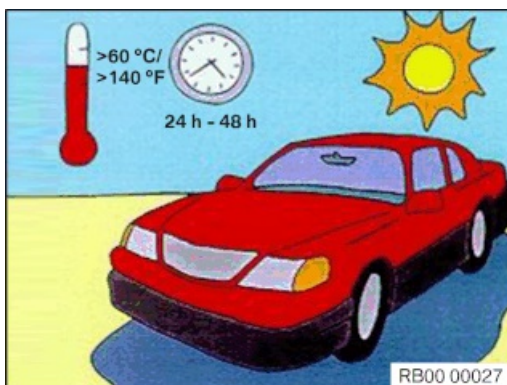
- In order to reduce the amount of force required, the film can be torn at the edge and pulled off in narrower strips.
- Remove the film in a surface temperature range of -10 °C to +50 °C.

Excessively high temperatures can lead to adhesive residue being left on the surface.

In order to achieve the recommended temperature for pulling off the adhesive film from the vehicle after direct exposure to the sun, it is possible to carry out a car wash with applied protective film in order to cool the vehicle down.

**Car wash and surface inspection:**

- Check vehicle surface after the car wash.
- Any adhesive residue left on the vehicle surface can be removed by rubbing by hand or using a cleaning agent R2 (part number 83 19 0 417 324) or stain remover (part number 83 11 9 407 816) and a lint-free cloth.

**Procedure in the event of paint swelling:**

- Any paint swelling normally disappears within 48 hours.
- Higher temperatures (infrared lamp) accelerate this process.
- Polishing of the surfaces is necessary only in rare cases if the heat treatment does not result in success.



00 Danger of injury if oil comes into contact with eyes and skin



Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin



Protective measures/rules of conduct:

- Wear safety goggles.
- Wear oil-resistant protective gloves.
- Observe country-specific safety regulations.



First aid measures:

- Eye contact: Immediately rinse out eyes with lots of water and for at least 15 minutes. In the case that it is available, use an eye wash bottle. If eye irritation persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

Note: Do not use solvents/thinners.



**Danger of poisoning!**

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

**Protective measures/rules of conduct:**

- Fill oil in appropriately marked containers only.
- Do not pour oil in drinking vessels (beverage bottles, glasses or cups).
- Observe country-specific safety regulations.

**First aid measures:**

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.



64 00 ... Information on using cleaning agent/paints (personal protection equipment)



Warning!

Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!

Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!



Important!

Observe following instructions:

- Store cleaning agents/paints only in a secure cabinet.
- Keep cleaning agents/paints away from naked flames and other sources of ignition.
- Protect cleaning agents/paints from high temperatures and direct sunlight.
- Always keep an eye douche on hand, change the water regularly (once a month).



Important!

Observe following instructions before use:

- Manufacturer's instructions (on container/packaging)
- Hazard warnings (on container/packaging)
- Manufacturer's instructions on package insert
- Material safety data sheet of manufacturer
- Product information in EPC
- National market regulations



Important!

Observe following instructions during use:

- Do not eat, drink or smoke while working with these products.
- Avoid direct contact with skin and eyes.
- Wear personal protective clothing/equipment.
- Ensure that all enclosed areas are well ventilated or extract fumes directly.
- Immediately change working clothes soiled with cleaning agent/paint.
- After finishing work, wash your hands and apply protective skin cream.



Important!

Follow hazard warnings and wear personal protection equipment!





First Aid:

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapours ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.



Recycling:

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.



64 53 ... Instructions for desiccant insert replacement



Special tools required:

- 32 1 270

A desiccant insert that is in a correctly functioning, sealed heating and air conditioning system does **not** have to be changed at regular service-inspection intervals.

However, the dryer flask or desiccant insert must absolutely be replaced in the event of:

- contamination of the refrigerant with swarf (e.g. when the compressor is clamped).
- With depressurised and/or completely drained refrigerant circuit.
- With a refrigerant circuit, which was closed using special tool 32 1 270 but remains open for more than 24 hours.

The desiccant insert cannot be replaced in the following vehicles:

- 1-Series E8x, 3-Series E9x from 12/2008
- E84, E89
- 1-Series F2x, 3-Series F3x
- BMW i 01 without heat pump

In these vehicles, the condenser for the heating and air conditioning system must be replaced.

- BMW i 01 with heat pump

On this vehicle the low pressure battery must be replaced.



**Warning!**

Only used a high pressure cleaner approved by BMW!

Only specially trained persons of 16 years of age or older may work with the high pressure cleaner.

Check the high pressure cleaner and electrical wiring for visible damage.

Only use at a suitable location.

**Attention!**

Pay attention to following hazard warnings:

- Danger of injury due to water jet
- Contact with hazardous substances in spray
- Risk of skidding on wet floor
- Risk of stumbling due to hoses and cables
- Comply with notes and instructions on handling cleaning agents !
- Risk of scalding when cleaning with hot water.
- On electric or hybrid cars, the safety instructions for handling with hybrid cars are to be complied with.

**Warning!**

The following personal protective equipment is to be used:

- Safety goggles/face guard
- Suitable gloves
- Apron
- Rubber boots
- Ear protectors
- Safety shoes

**Attention!**

Notes on washing a vehicle with a high pressure cleaner:

- Do not wash directly on gaskets and control units during engine washes.
- A minimum distance of 30 cm must be adhered to for tyres and tyre valves.
- A minimum distance of 30 cm must be adhered to for the soft top and painted parts.
- Do not use if engine is still hot.
- Do not exceed maximum water temperature of 60 degrees.
- Do not spray directly onto cameras/sensors.





Attention!

- For your own safety, we recommend that you do not wash on the high-voltage components in electric or hybrid vehicles.



00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



Warning!

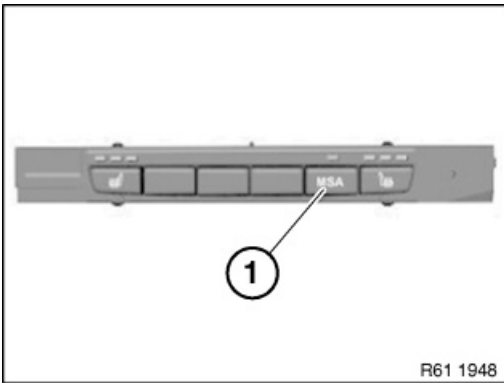
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

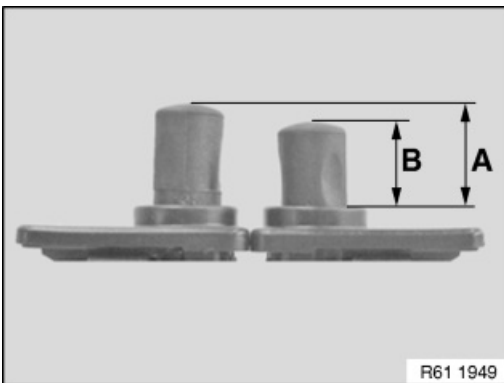
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode
 $A = 10 \text{ mm}$
 - Basic setting (engine hood/bonnet open)
 $B = 7 \text{ mm}$

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



When working with diagnosis tools:

- Observe instructions in diagnosis tool





Note:

For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) Service Information (bulletin) 61 01 07 335
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) Service Information (bulletin) 61 01 10 629



**Warning!**

Danger of poisoning if oil is ingested/absorbed through the skin!
Risk of injury if oil comes into contact with eyes and skin!

**Recycling:**

Observe country-specific waste disposal regulations.

**Measures if oil is unintentionally released:**

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

Note: Do not flush oil away with water or aqueous cleaning agents.



**Warning!**

Precautionary rules and measures which protect mechanics and other personnel against injury (including life-threatening injuries).

For example: **Warning!**

Risk of scalding!

Only perform this work after engine has cooled down.

**Important!**

Specific instructions and precautionary measures which prevent damage to the vehicle or to vehicle parts. Failure to comply with the above will invalidate any warranty claims.

The caution symbol is used in all repair instructions.

However, use of the warning word "Caution!" is not binding in every case.

The notes, instructions and precautionary measures mentioned above retain their validity.

**Warning!**

High-voltage system - danger to life!

Before beginning work, follow the applicable safety rules and perform the necessary preliminary work.

Note:

High-voltage symbol for hybrid cars (electrically powered vehicles) E72 and MINI E.

**Warning!**

High-voltage system - danger to life!

Before beginning work, follow the applicable safety rules and perform the necessary preliminary work.

Note:

High-voltage symbol for hybrid car (electrically powered vehicle) from F04.

*Note:*

Particular information on improved procedures for operation, testing, adjustment and upkeep.

Also indicates the end of a repair section.

**Recycling:**

Observe country-specific waste disposal regulations





General information:

Refers to other instructions: such as e.g.:

Necessary preliminary tasks;

Further instructions: refer to operating instructions for balancing machine.



Replacement:

Carry out programming/encoding.

Note:

Many electronic control units must be programmed/coded (e.g. when replaced).



Note (symbol for diagnosis system):

- Connect BMW diagnosis system



Important!

Read and comply with notes on protection against damage from electrostatic discharge (ESD protection).

Note:

Electronic control units and other electronic components - if handled incorrectly - can be damaged or destroyed by electrostatic discharge.



Special tools required: *Note:*

List of special tools needed in these repair instructions.



Important!

Do not oil or grease component or tool.

Note:

Oil and grease will impair or damage the function of the component or tool.



Warning!

Laser beam!

For example:

Adjusting device emits laser beam. Do not look into the beam!

Note on laser class.



Important!

Use eye protection for the following operations.

For example:

Fuel can emerge spontaneously at high speed when the fuel delivery line is released!





Important!

Use ear protection for the following operations.



Important!

Use eye protection and ear protection for the following operations.



Important!

Use face protection for the following operations.



Important!

Use protective gloves for the following operations.

Avoid skin contact.



Important!

Use eye protection and protective gloves for the following operations.

Avoid eye contact and skin contact.



Warning!

Danger of explosion!



First aid measures:

Note on first aid measures that need to be administered immediately.



**Warning!**

Danger to life!

Read and follow operating instructions for vehicle hoist.

Do not exceed approved load-carrying capacity and load distribution of vehicle hoist.

Weight compensation may be necessary due to the loading situation of the vehicle.

This also applies in the event of considerable removal of parts or conversions on the vehicle.

Note:

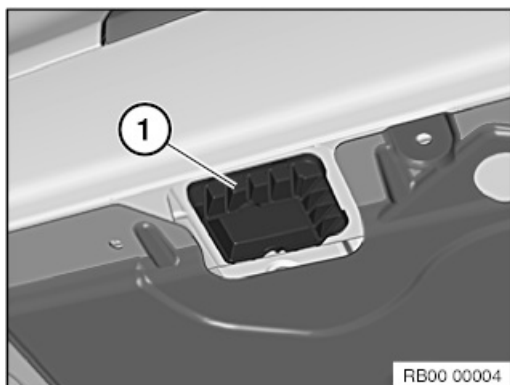
The vehicle hoist must comply with the relevant statutory/country-specific accident prevention regulations and be serviced according to the regulations.

**Caution!**

Risk of damage!

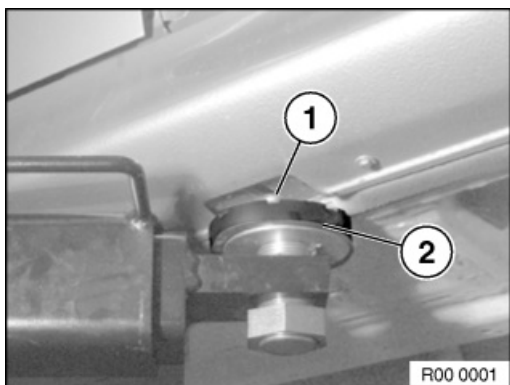
Before driving onto a vehicle hoist, make sure there is sufficient ground clearance between the vehicle hoist and the vehicle.

The vehicle may only be raised with the vehicle hoist at the four jacking points.

**Caution!**

All four jacking points (1) must be available!

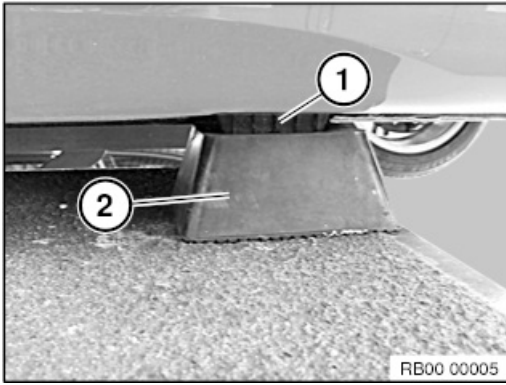
Never raise the vehicle without the jacking points (1)!

**Caution!**

Risk of damage!

Align support plates (2) of lifting platform arms to jacking points (1) in such a way that no adjoining components are touched and thereby damaged.





Caution!

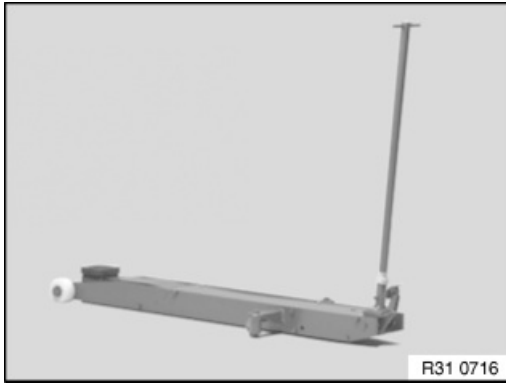
Risk of damage!

Align the rubber block (2) with the jacking points (1) in such a way that no adjoining components are touched and thereby damaged.

Never raise the vehicle without rubber blocks (or rigid foam blocks)!

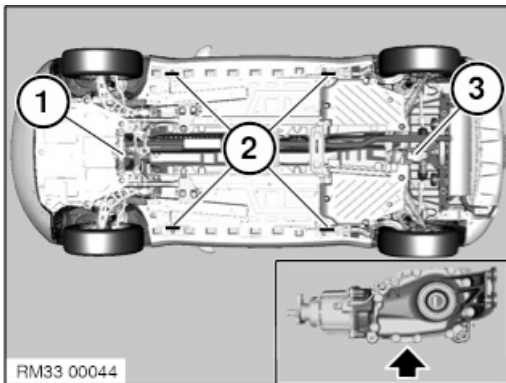
There is a major risk of damage to the vehicle underbody!



**Caution!**

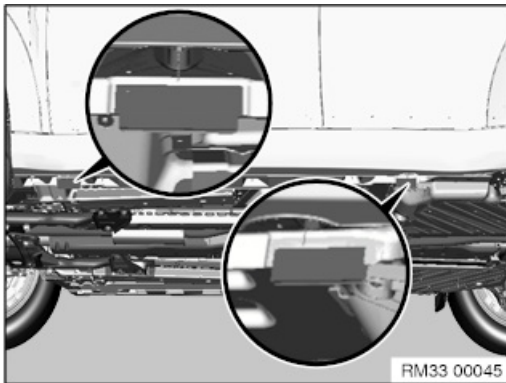
Observe the following trolley-jack-related notes:

1. Only BMW-distributed/approved trolley jacks which have a rubber plate on their mounting are to be used.
2. Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!
3. Check the rubber plate on the trolley jack prior to each use, replacing if necessary.

**Warning!**

The vehicle may be raised with a trolley jack only at the following mounting point!

- 1 Front strut at front axle support
- 2 Side car jacking points
- 3 Rear axle differential (only all-wheel drive vehicle)

**Risk of damage!**

Align the rubber plate on the trolley jack to the jacking points in such a way so there is no contact to adjacent components and they are therefore not damaged.





Screw securing adhesive is a means of preventing a screwed connection from being loosened by external influences.

Once the screw has been coated with adhesive, the adhesive remains inactive until such time that it is activated by the encapsulation breaking when the screw is inserted and then cures (hardens) at room temperature.



Installation note:

- Screw connection must be completed within 20 mins. (start of curing)
- Microencapsulated screws must not be retightened
- Thread of nut must be cleaned beforehand in event of repeated use



61 12 ... Information on intelligent battery sensor (IBS)

Notice! Do not connect the charger to the 12 V charging socket

The 12 V charging socket is supplied with voltage by the rear power distribution box via relay. This relay drops out after terminal 15 OFF. This means that a trickle charger connected at the 12 V charging socket will be disconnected from the battery. Only charge the battery via the jump start terminal point. Only then can the voltage supply be registered by the vehicle.

Warning! Danger of destruction in event of mechanical strain

- Do not introduce any additional connections at the battery negative terminal.
- Do not modify the grounding cable. The ground cable also serves heat dissipation.
- Do not establish any connection between the IBS and the sensor screw.
- Do not use force when disconnecting the pole shoe from the battery terminal:
 - Do not pull on the ground cable.
 - Do not place any tools under the IBS to lever off the pole shoe.
- Do not use IBS connections as levers.
- Use a torque wrench and set tightening torque in accordance with repair instructions.
- Do not release or tighten down sensor screw (Torx screw).
- Avoid contact between IBS and ground.

Warning! Danger of destruction to IBS and wiring upon battery replacement

- The IBS and wiring can be destroyed by mechanical strain upon battery replacement. Therefore avoid mechanical strain.
- The size (capacity) of the battery required for the car is coded in the Car Access System (CAS).
- Use the battery size (capacity) installed as standard upon battery replacement.
- Recode the Car Access System (CAS) when installing a battery with a different capacity.
- Register battery replacement via Service functions in diagnosis system.
- Delete fault code entries in the Digital Engine Electronics (DME) associated with battery replacement.
- Always proceed in accordance with the repair instructions.

Note: Battery draining possible in spite of the intelligent battery sensor IBS being fault-free.

- A battery can be drained (e.g. with lights or radio switched on) even when the IBS functions perfectly in conjunction with power management.
- **For this reason, only exchange the IBS when there is a corresponding fault code entry!**



12 00 ... Notes for disconnecting and connecting battery

Observe safety informations for handling vehicle battery.

Before disconnecting battery:

Turn off the ignition and other electrical loads/consumers to prevent sparking when reconnecting.

Note:

If the ignition is not turned off when the battery is disconnected, fault memories may be set in some control units.

Attention!

- There is a danger of mixing up battery cables: If the positive battery cables and negative battery cables are the same colour and you are in doubt, follow the polarity to the battery, then mark and cover the wires.
- On vehicles with radio code: After disconnecting the battery, the radio code must be re-entered. Therefore obtain the radio code card from the customer beforehand. Note stored stations and restore them after connecting the battery.
- Stored settings of the on-board computer and clock will also be lost.
- All available ignition keys with infrared transmitter must be recoded for vehicles with first generation infrared central locking.

General notes on disconnecting battery:

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- On vehicles with IBS at negative battery terminal:
Do not under any circumstances pull/lever off pole shoes by force.
Do not under any circumstances release the hexagon socket screw of the IBS.
- Detach the terminal of the battery earth lead from the vehicle battery and the auxiliary battery if available. Cover battery negative terminal(s) and secure.
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the battery is connected.
- When installing battery terminal: Tightening torque 61 21 1AZ.

After connecting battery:

Attention!

The scope of application of some systems may be restricted after an open circuit.

Likewise, individual settings may be lost.

Settings or activations must be carried out, depending on the equipment specification.

For example:

- Vehicles with automatic engine start-stop function (MSA):
MSA function is active only after teach-in time (vehicle must not be woken for a period of approx. 6 hours) > if necessary, notify customer of the situation
- E46 (all-wheel drive vehicle) / E53 / E83: Carry out steering angle sensor adjustment
- Activate slide/tilt sunroof, if necessary
- If necessary, activate power windows
- If necessary, activate mirror with compass
- Only E60, E61, E63, E64, E70, E71, E90, E91, E92, E93: mount steering angle

Vehicles with a two-battery system

Starter and system battery



A circuit for the starter battery and a circuit for the system battery are part of a two-battery system. An auxiliary control unit monitors both circuits. Depending on the situation, the circuits are connected to or isolated from the auxiliary control unit via a cut-off relay.

Two AGM batteries, whose design and properties are described in AGM batteries, are used as a storage battery.

Attention!

These batteries must not under any circumstances be charged with a voltage in excess of 14.8 V. Rapid programs must not be used either.

Receiving/giving starting aid via jump start terminal point

The engine can be jump-started with an external voltage supply via the jump start terminal on the right side of the engine compartment.

Note:

The starter battery is isolated from the alternators when the bonnet is open.

Giving starting aid via the jump start terminal point is thus limited by the capacity of the starter battery when bonnet is open.

Charging starter and system batteries via jump start terminal point

The starter battery is charged as a matter of priority with a charger connected to the jump start terminal. The voltage at the starter battery is the decisive factor in determining whether the system battery is also included in the charging operation. The auxiliary control unit automatically detects a charging operation at a charging voltage at the starter battery of ≥ 13.5 V. The cut-off relay is closed and thus the system battery is connected in parallel. Both batteries are now charged.

Prerequisite:

- Terminal 61 inactive
- Terminal 15 inactive

If terminal 15 becomes "active" during the charging procedure, the cut-off relay is opened immediately and again only the starter battery is charged.

Note:

When the bonnet is open, the cut-off relay is also opened in normal operation when the engine is running.

A special mode can be set by means of diagnosis for workshop/garage operation. The cut-off relay is closed from terminal R in this operating mode. This mode is automatically reset once a distance of 5 km has been driven.

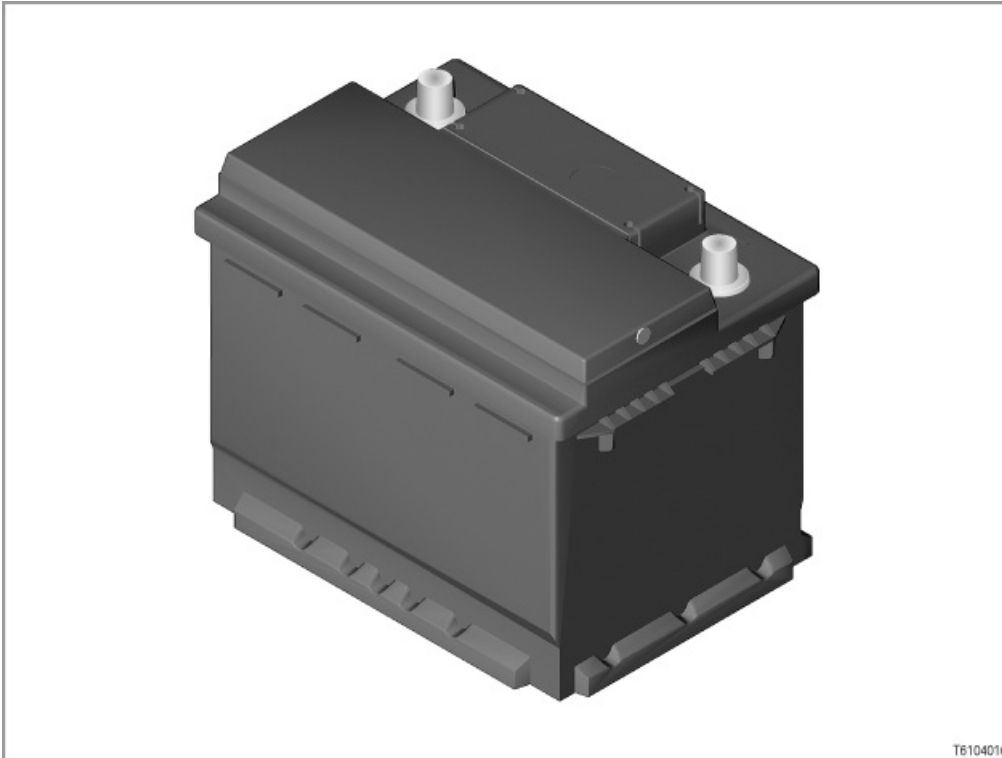
Trickle charging

The increased standby current consumption can be compensated for via the jump start terminal point with the aid of the "Acctiva easy" trickle charger (Service Information 2 03 05 205).

Attention!

The cigarette lighter is isolated from the electrical system after terminal R "OFF" on a timed basis (60 mins.), thereby interrupting charging of the system battery via the cigarette lighter. This is prevented if the battery switch (on the right side of the luggage compartment behind the trim panel) is turned on and off again twice within 2 seconds.





Introduction

In September 2002, the first so-called VRLA batteries, better known as **AGM batteries** came into use. (VRLA stands for **V**alve **R**egulated **L**ead **A**cid, i.e. lead-acid battery with pressure relief valve; **AGM stands for** **A**bsorbent **G**lass **M**at, i.e. absorbent glass-fibre fleece).

The constantly increasing energy demand of modern vehicle electrical systems calls for ever more powerful battery solutions. A modern luxury-class vehicle has some 100 actuator motors that have to be fed with electrical current. Added to these are safety, environmental and comfort elements which are increasingly becoming standard features, such as e.g. Antilock Brake System (ABS), Dynamic Stability Control (DSC), steering assistance (EPS), electronic chassis and suspension control, air conditioning and navigation system. Current consumption is considerable even when the vehicle is not in use.

The somewhat higher price compared with a battery of similar size is fully balanced by the following benefits:

- greatly longer service life
- improved starting reliability at low temperatures
- reliable starting of engines with high starting current requirements, e.g. high-performance diesel engines
- 100 % freedom from maintenance
- low risk in the event of an accident (reduced environmental risk)

Service life of AGM batteries



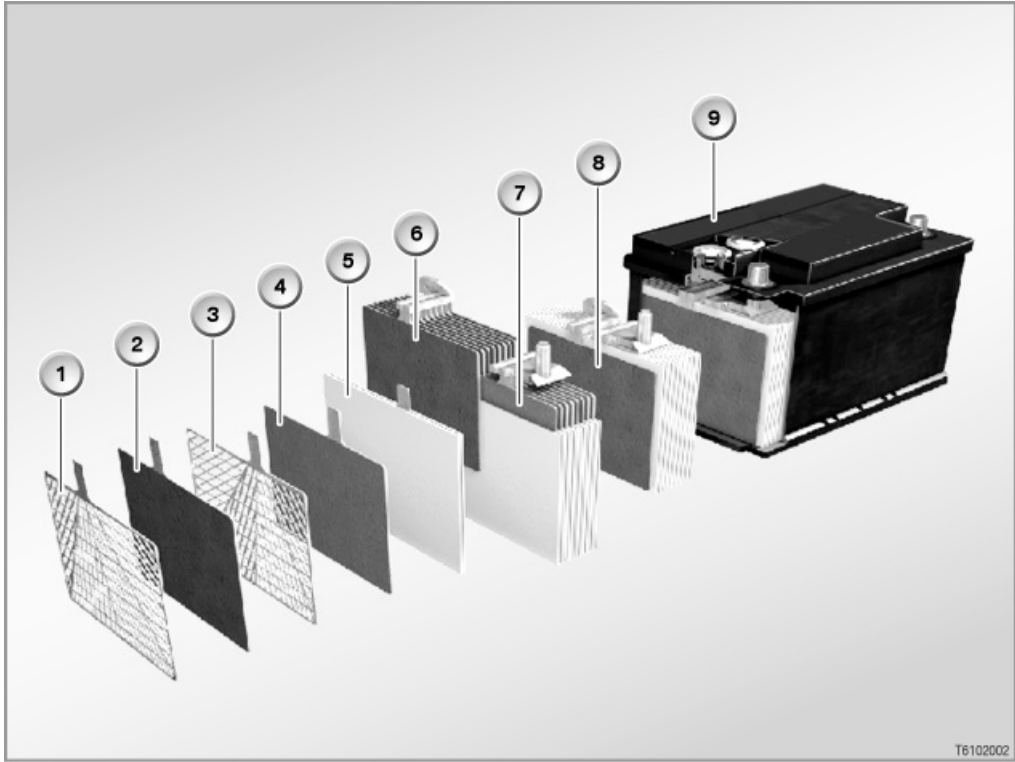


Item	Explanation	Item	Explanation
1	Available capacity [%]	2	Mileage [thousand km]
3	AGM battery	4	Lead-calcium battery
5	50 % capacity limit		

In contrast to conventional lead-calcium batteries, the sulphuric acid in a battery with fleece technology is not held freely in the battery housing. Rather, 100% of the sulphuric acid is bound into the mats of the glass-fibre fleece (separators). For this reason, no battery acid can escape if the battery housing is damaged. In addition, the AGM battery is sealed to be airtight. This is possible because the gases are converted back into water by the permeability of the separators.

Brief component description

The AGM battery has a black housing and the so-called "Magic Eye" is missing.



Item	Explanation	Item	Explanation
------	-------------	------	-------------



1	Positive grille with silver alloy	2	Positive plate
3	Negative grille	4	Negative plate
5	Separator made of glass-fibre fleece	6	Set of positive plates
7	Set of negative plates	8	Block of plates
9	Block box with base strips		

Construction

The AGM battery differs from the conventional lead calcium battery as follows:

- larger plates: Larger plates allow a 25% larger power density.
- Separators made of glass-fibre fleece: These can cause an up to 3-times higher cycle stability to be reached. This improves the cold starting capability, the power consumption and service life.
- Airtight housing with pressure relief valve (please refer to "How it works"):
The inspection plugs are sealed and can not be opened.
- Battery acid bound in glass-fibre fleece: Battery acid is not found free in the housing as before, but is rather bound 100% in the glass-fibre fleece. This gives increased security against the acid escaping and thus reduces the environmental risk.

How it works

The AGM battery differs from conventional batteries in its non-polluting and substance-retaining behaviour during charging.

When a battery is charged, the electrolysis process emits the gases oxygen and hydrogen.

- In a conventional wet lead calcium battery, the two gases hydrogen and oxygen are dissipated into the atmosphere.
- In an AGM battery, the two gases are converted back into water: The oxygen which is created at the positive electrode during charging passes through the permeable glass fibre fleece to the negative electrode. At the negative electrode the oxygen reacts with the arriving hydrogen ions in the electrolyte to form water (oxygen cycle).

In this manner, the gas and thus also the electrolyte are not lost.

Only in the event of an excessively heavy build-up of gas, i.e. excessively high pressure build-up (20 to 200 mbar), does the pressure relief valve discharge the gas. In this process, the pressure relief valve does not allow any oxygen in the air to enter. Because the pressure in the battery is regulated by a valve, the AGM battery is also known as the VRLA battery (valve-regulated lead acid).

Notes for Service department

It is necessary when handling an AGM battery to observe some particular points pertaining to battery changing and installation location.

Charging

Warning! Do not charge the AGM battery with > 14.8 V. Do not use rapid-charging programs!

When charging removed batteries (so-called stand-alone batteries), do not exceed the maximum charging voltage of 14.8 V at room temperature. Also, for charging via the external start connection point, the maximum charging voltage of 14.8 V at room temperature must not be exceeded. The battery can be damaged even if the AGM battery is only briefly charged with a charging voltage higher than 14.8 V. A charging voltage of more than 14.8 V is usually used in quick-charging routines.

Installation location

Warning! Do not install the AGM battery in the engine compartment.

The AGM battery must not be installed in the engine compartment on account of the high spatial temperature differences, otherwise its service life will be significantly shortened.

Housing



Warning! Do not open AGM batteries.

On no account may AGM batteries be opened, as the ingress of oxygen from the atmosphere would cause the battery to lose its chemical balance, rendering it unserviceable.



**Important!**

To avoid damage when handling optical fibres, comply with the following points:

- The minimum permitted bending radius is 25 mm
- Do not subject optical fibres to compressive and tensile load
- Protect optical fibres against the effects of heat $\geq 85^{\circ}\text{C}$ (e.g. during welding work, drying work with infrared beams or hot air blower)
- Fibre-optic cables are permitted to show only one junction point (bridge), replace fibre-optic cables if necessary

*Note:*

The optical fibres are coloured differently as follows:

- Green = **MOST** (**M**edia **O**riented **S**ystems **T**ransport) optical fibre
- Yellow = **ISIS** (**I**ntelligent **S**afety and **I**ntegration **S**ystem) optical fibre
- Orange=repair fibre-optic cables

Follow notes for processing cables and optical fibres.



**The following applies in general:**

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies:Shielded lines

Interference radiation and interference resistance can lead to neutral zones at contact points in the shielding. Consequently, distinctions have to be drawn between the following types:

Coaxial lines

- Shielded coaxial cables RTK031 may only be repaired with special crimping tool.
- For aerial lines only the bushing contact may be repaired.
- RG174 Lines and the bushing contact may not be repaired.

CVBS lines

- CVBS cables may not be repaired.
- CVBS cables must be replaced in their entirety.

HSD lines

- HSD cables may not be repaired.
- HSD cables must be replaced in their entirety.

Optical fibre cable:*Note:*

Fibre-optic cables are coloured differently as follows:

- Green = **MOST** (Media Oriented Systems Transport) optical fibres
- Yellow = **ISIS** (Intelligent Safety and Integration System) optical fibres
- Orange=repair fibre-optic cables

Attention!

- Fibre-optic cables are permitted to show only one junction point (bridge), replace fibre-optic cables if necessary
- Smallest permissible bending radius is 25 mm
- Avoid effects of heat $\geq 85^\circ$

Treating cables and optical fibres

FlexRay (twisted cables)

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

Note:

- FlexRay lines may only reveal one separation point (bridge) per line



- Flexray lines may only reveal one separation point (bridge); renew complete line if necessary.
- If possible, maintain twisted cable after repair.
- After repairs, twist cables as close as possible to the connector/separation point.
- Twisting must be as symmetrical as possible.

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables

Replacing wiring harnesses

Repair wiring harnesses mainly cover the full equipment of the vehicle. If certain optional equipment is not installed in the vehicle, note the following:

- If necessary, secure the remaining connectors.
- If necessary, seal the remaining connectors outside the vehicle interior, for example, with butyl tape in such a way that moisture ingress can be eliminated permanently.

Note:

Repair wiring harnesses can be equipped with an **additional socket housing** (e.g. 30-pin), **which was not provided on the previous vehicle-side wiring harness**. This socket housing also cannot be found in the wiring diagram.

Procedure

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **in the vehicle interior** (in the footwell, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.
- Alternatively, a suitable pin housing can be fitted on the vehicle-side wiring harness and connected to the additional socket housing.

However, this is permitted only if the following conditions are met:

- Carpets must not protrude visibly or become deformed due to the installation of the additional plug connection.
- It must be possible to install the adjacent components (for example, trims, trim panels, etc.) correctly after installing the additional plug connection.
- All the attachment points of the adjacent components (for example, trims, trim panels, etc.) must engage correctly.
- There must be no rattling noise due to the installation of the additional plug connection.
- The additional plug connection must not damage the adjacent components/wiring harnesses, etc..

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **outside the vehicle interior** (in the wheel arch, for example):

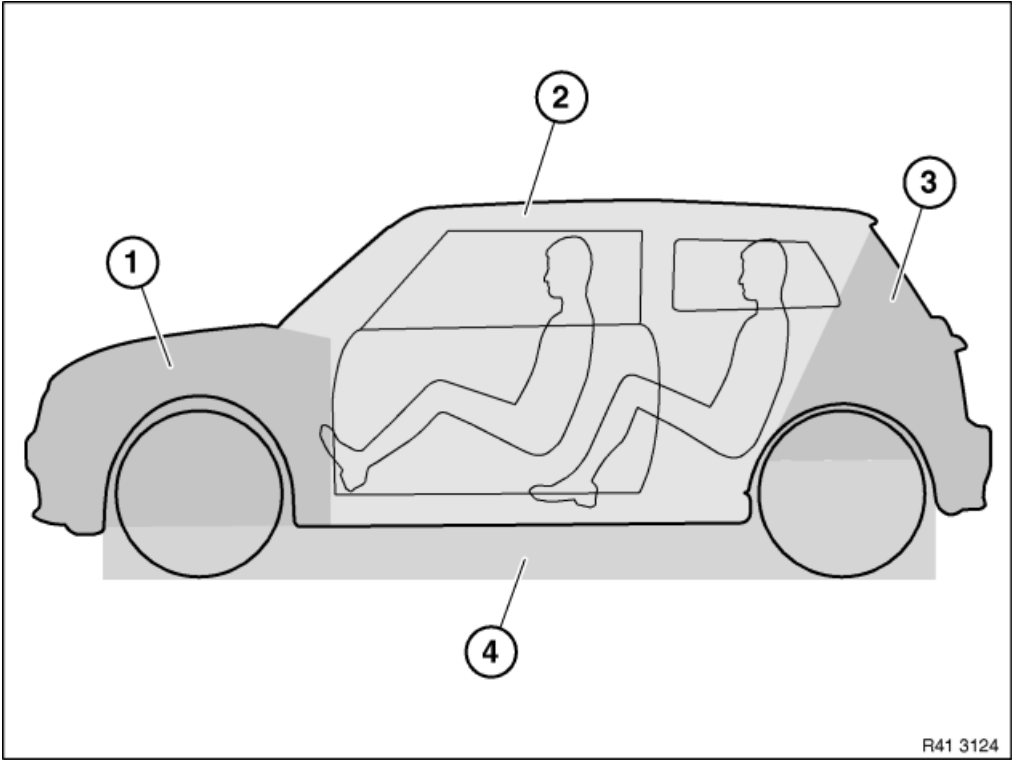
- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.



- **Using the additional socket housing is not permitted with a separation point outside the vehicle interior.**



00 00 ... Information/warning labels



1	Engine compartment	3	Rear end
2	Interior	4	Underfloor

Location: Information/warning label: Country:

Engine compartment (1):		
Radiator bracket, top	Refrigerant	All with S530A/S534A
Radiator bracket, top	Radiator fan	All
Support carrier, outer	Laser - production date	Great Britain, Australia only
Support carrier, outer	Laser - exterior paint	US, CDN, Japan, Australia, Gulf States only
Ignition coil cover	Ignition coil	All
Second bulkhead	Laser - brake fluid	CDN only
Servo reservoir cap	Hydraulic steering fluid reservoir	All
Support carrier, outer	Exhaust gas	US, CDN only
Cylinder head	"MINI Recommends Castrol"	Diesel RB11 & RB12 only
Tension strut with hydro-mount	Do not lash down	Nat. var. China / CKD

Interior (2):		
Windscreen	Vehicle identification number	All
Windscreen, inner	Airbag	All
Instrument panel	Airbag	US, CDN
Side trim panel, rear	Lock, through-loading	All
Fuse box, inner	Fuse assignment	All



Trim, cowl panel	Soft top, warnings	All

Complete vehicle, bodysell:		
B-pillar, inner left	Manufacturer's certificate	US, CDN, Gulf States
B-pillar, inner left	Tyre inflation pressure	EU, Australia, CDN
B-pillar, inner left	Runflat indicator	All
B-pillar, inner right	Front passenger airbag	All except US
B-pillar, inner right	Barcode laser - EC type plate with model designation, vehicle identification number, colour code	Not US, CDN, Japan, Australia, Gulf States
Fuel filler flap	Fuel	All
Tank cap	Diesel fuel	Diesel only

Rear end (3):		
Trim panel, luggage compartment floor	Pictogram, spare wheel raising	With S300A only
Flap, side trim panel, rear	First aid kit	With S428A only
Rear lid, outer	Barcode	Great Britain, US, CDN
Rear lid, left	Breakdown assistance, accident hotline	Germany only
Rear Lid	Load	R52 only

Underfloor (4):		
Steering spindle	Airbag (basic setting)	Germany only



Key:

EU = European Union

CDN = Canada

US = United States



64 53 ... Instructions for replacement of air conditioning condensers and radiator/coolers

Attention!

Even when they are correctly installed or due to normal driving, radiators (oil cooler, radiator, charge air cooler) or air conditioning condensers may show slight impressions or deformations on their discs (1).

A slight sag with a large radius for the air conditioning condenser is also permissible.

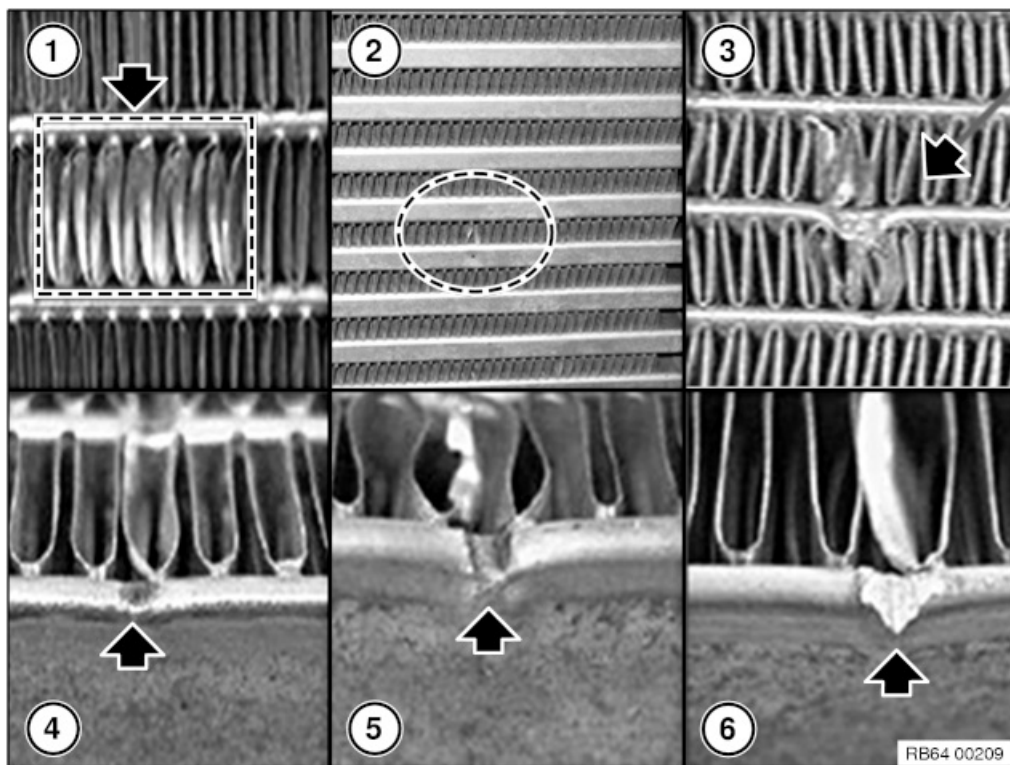
As long as tightness/function are not degraded and an adequate distance of a few mm between the radiator and air conditioning condenser remains in place, **this is not damage in either case.**

Radiators or air conditioning condensers are not to be replaced in these cases!

Note:

The deformations shown in Fig. (1) can be bent back with a standard fin comb..

Damage to lines carrying media or on the flat pipe require exchange of the radiator or air conditioning condenser (2-6).



Dryer flask (integrated in the air conditioning condenser):

Round dents/depressions are permitted.

The air conditioning condenser is not to be replaced in this case.



64 50 ... Instructions for handling R 134a refrigerant

Warning!

Although R 134a at normal temperature is non-toxic, non-flammable and not explosive in air in any mixture ratio, it is still essential to follow various safety precautions.

The filled refrigerant circuit of the A/C system is subject to excess pressure. When carrying out repairs on the air conditioning, it is absolutely essential to draw off the refrigerant.

Do not weld or solder on to filled A/C systems or in rooms into which R 134a may have leaked. Exposure to flames or high temperatures ($\geq 50\text{ }^{\circ}\text{C}$) may give rise to toxic decomposition products (fluorine gas). For this reason, do not smoke either.

R 134a must be drawn off, cleaned and returned to the air conditioning with a service station following the relevant operating instructions.

Avoid all contact with liquid or gaseous R 134a. Wear safety goggles and gloves when working on the refrigerant circuit. R 134a acting on the skin can cause frostbite. Rinse affected body parts thoroughly with cold water. If R 134a gets into your eyes, likewise rinse with plenty of water and, if necessary, remove contact lenses if worn. Then seek immediate medical attention. Likewise seek immediate medical attention if you experience problems after inhaling R 134a fumes.

As a gas, R 134a is colourless, odourless and heavier than air. If it enters the atmosphere, this may result in an imperceptible danger of asphyxiation or in cardiac palpitations, especially in workshop pits. Ventilate rooms adequately; if necessary, turn on installed extractor systems.

For a properly functioning air conditioning, it is essential to have the greatest possible levels of cleanliness when working on the air conditioning and the best possible evacuation (at least 30 minutes dehumidification from refrigerant circuit) before each filling of the air conditioning.

R 134a absorbs moisture very easily. Therefore, seal off opened pipes, condenser, evaporator, compressor and dryer flask immediately with plugs.

With exchange parts, the plugs may only be removed immediately before the lines are connected.

In the event of warranty claims, the used parts must be provided with seal plugs to be able to determine the cause of the damage.

If an air conditioning has been completely drained by leakage, accident or repair, the drier element must be replaced as excessive moisture may have entered the system.

Store filled refrigerant pressure cylinders in such a way that they are not exposed to direct sunlight or other heat sources (max. $45\text{ }^{\circ}\text{C}$). Also avoid exposing them to mechanical stress (e.g. by dropping).

In the event of fire, carbon dioxide (CO_2), extinguishing powder and a sprayed water jet are deemed to be suitable extinguishants. Cool reservoirs at risk with a sprayed water jet (risk of bursting!).

Important!

After each refilling of an air conditioning, check that protective caps of filling valves are hand-tight. They serve as additional seals.



64 50 ... Instructions for handling R1234yf refrigerant

Work on the refrigerant circuit may only be carried out by experts!

Avoid all contact with liquid or gaseous R1234yf. Wear protective goggles and gloves when working on the refrigerant circuit.

- Follow safety information for handling refrigerant R1234yf!

Warning!

Although R1234yf at normal temperature is non-toxic, non-flammable and not explosive in air in any mixture ratio, it is still essential to follow various safety precautions. **At higher temperatures, R1234yf is inflammable.**

As a gas, R1234yf is colourless, odourless and heavier than air. If it enters the atmosphere, this may result in an imperceptible danger of asphyxiation or in cardiac palpitations, especially in workshop pits. Ventilate rooms adequately; if necessary, turn on installed extractor systems.

Store filled refrigerant pressure flasks so that they are not subject to direct sunlight or other heat sources (at maximum 45 °C). Also avoid exposing them to mechanical stress (e.g. by dropping).

Do not weld or solder on to filled air conditioning systems or in rooms into which R1234yf may have leaked. Exposure to flames or high temperatures (≥ 50 °C) may give rise to toxic products of decomposition (hydrofluoric acid). For this reason, do not smoke either.

In the event of fire, carbon dioxide (CO₂), extinguishing powder and a sprayed water jet are deemed to be suitable extinguishing agents. Cool reservoirs at risk with a sprayed water jet (risk of bursting!).

If the protective caps on the filler valves are difficult to open, there is a risk of injury from leaking valve inserts (high pressure).

The filled refrigerant circuit of the A/C system is subject to excess pressure. Before carrying out repairs on the A/C system, it is absolutely essential to draw off the refrigerant.

- Before conducting repairs, check the actual pressure drop on the pressure gauge of the A/C service station

R1234yf must be drawn off, cleaned and returned to the A/C system using an A/C service station following the relevant operating instructions.

For a properly functioning A/C system, it is essential to have the greatest possible levels of cleanliness when working on the A/C system and the longest possible evacuation (at least 30 minutes dehumidification from refrigerant circuit) before each filling of the A/C system.

R1234yf easily absorbs moisture. Therefore, seal off opened pipes, air conditioning condenser, evaporator, air conditioning compressor and dryer flask immediately with seal plugs.

- If air conditioning has been completely drained by a leak, accident or repair, the desiccant insert must be replaced as excessive moisture may have entered the system.

With replacement parts, the plugs may only be removed immediately before the lines are connected. In the event of warranty claims, the old parts must be provided with plugs to be able to determine the cause of the damage.

Installation note:

After each refilling of an air conditioning, check that protective caps of filling valves are hand-tight. They serve as additional seals.



**Attention!**

Specific to the country , 2 different refrigerants (R134a, R1234yf) are used.

Specific to the country, the vehicle and the year of manufacture 2 different refrigerant oils (ND-8, Sanden SP-A2) are used.

Before carrying out repairs on the refrigerant circuit, always determine which refrigerant/refrigerant oil is used in the vehicle!

Refrigerant: This information can be found on the **type plate** on the bonnet.

Refrigerant oil: This information can be found on the **type plate** on the front flap in vehicles with a production date from 2013.



**R1234yf refrigerant is used in the following countries:**

Observe notes on handling R1234yf refrigerant!

Europe				Asia	America
Belgium	Great Britain	Malta	Sweden	Israel	USA
Bosnia and Herzegovina	Ireland	Macedonia	Switzerland	Turkey	Canada
Bulgaria	Iceland	The Netherlands	Slovakia	India*	
Denmark	Italy	Norway	Slovenia	South Korea	
Germany	Croatia	Austria	Spain		
Estonia	Latvia	Poland	Czech Republic		
Finland	Liechtenstein	Portugal	Hungary		
France	Lithuania	Romania	Cyprus		
Greece	Luxembourg	Serbia			

*Only applies to vehicle models with Europe version. All other vehicle models have R134a.

Introduction of R1234yf refrigerant:

European countries listed in the table, Turkey and Israel:

- BMW i as of 09/2013
- from 07/2016, BMW, MINI, RR

USA and Canada:

- from 07/2016 BMW, BMW i, MINI

South Korea:

- from 11/2018 BMW, BMW i, MINI

The introduction date may vary slightly according to the specific country and model.

The refrigerant R134a will continue to be used **in all other countries**.

Observe notes on handling R134a refrigerant!





Refrigerant oil Sanden SP-A2 is used for both, R1234yf and R134a.

Observe notes on handling refrigerant oil!



Attention!

I01, I12 with production date up to 08/2014:

In the national-market version with R134a a wrong refrigerant oil is present on the type plate

Always use Sanden SP-A2

(Part number of Sanden SP-A2: 2 339 920)

Attention!

Only vehicles with a production date from 09/2013 and **R1234yf** refrigerant/Sanden **SP-A2** refrigerant oil can be filled using the A/C service station for **R1234yf**.

In addition to vehicles with a production date from 09/2013, also all previous vehicles **without the electric A/C compressor** with **R134a** refrigerant and both **ND-8** and Sanden **SP-A2** refrigerant oil can be filled using the A/C service station for **R134a**.

Exception:

BMW i and hybrid vehicles (with an electric A/C compressor) that are filled with **R134a** refrigerant/Sanden **SP-A2** refrigerant oil. These vehicles must be injected with Sanden **SP-A2** refrigerant oil.

When filling the refrigerant circuit with R134a, always ensure you use the correct, vehicle-specific refrigerant oil type!

The previous ND-8 refrigerant oil must not be mixed with Sanden SP-A2 refrigerant oil!

In other words, the refrigerant oil ND-8 must not be filled in refrigerant circuits which were filled with Sanden SP-A2 in the factory.

Sanden SP-A2 refrigerant oil may be mixed with ND-8 refrigerant oil in vehicles without an electric A/C compressor.

In other words, the refrigerant oil Sanden SP-A2 must be filled in refrigerant circuits which were filled with ND-8 in the factory.

However, this is permitted **only** in vehicles **starting from F-series**.

Note the overview of the refrigerant oil to be filled.

To prevent inadmissibly mixing the different refrigerant oil types, rinse the A/C service station hoses after each drawing off/filling procedure!



**Warning!**

Danger of injury!

Refrigerant circuit is under high pressure! Work on the refrigerant circuit may only be carried out by experts!

Draw off refrigerant without fail **BEFORE** all repair work on the refrigerant circuit.

The refrigerant circuit is depressurised **AFTER** drawing off.

- The pressure gauge on the A/C service unit must be checked for the actual pressure drop prior to repair work.

It is absolutely essential to read and observe the relevant operating instructions for the A/C service unit used!

At high temperatures, R1234yf is inflammable!

**Protective measures/rules of conduct:**

- Wear safety goggles
- Wear oil-resistant protective gloves
- Do not smoke!
- Observe country-specific safety regulations.

**First aid measures:**

- Eye contact: In the event of contact with the eyes, rinse immediately with plenty of running water and consult an ophthalmologist.
- Skin contact: In the event of contact with skin, remove affected clothing immediately and rinse with plenty of water.
- After inhalation: If refrigerant vapours are inhaled in greater concentrations, remove the person affected to an area of fresh air and keep them under supervision. Call for a doctor. If breathing problems are experienced, breathe additional oxygen. If the person affected is breathing with difficulty or has stopped breathing, incline the person's head at the neck and administer the kiss of life.



34 00 ... Testing of service brakes at the official periodic vehicle check according to EU Directive 2010/48/EU and Germany § 29_StVZO for vehicles with first registration beginning on July 28, 2010.

Series: 1: E81-E88; F20-F21 / 3: E90-E93; F30-F31 / 5: F07-F11; F18 / 6: F06,F12-F13 / 7: F01-F04; X1: E84 / X3: F25 / X5: E70 / X6: E71-E72 / Z4: E89 / MINI: R55-R61 / Rolls Royce

Situation:

For official periodic vehicle inspections according to EU Directive 2010/48/EU and § 29 of the German road traffic licensing regulations (StVZO) as per the revised directive, new inspection specifications apply beginning on 01.07.2012 for the functional test of the service brakes on EU Class M1 vehicles (passenger car up to 3.5 t permitted total weight) and first registered from 28.07.2010 onwards.

Prior the mechanical brake force measurement the electronic function check for the corresponding brake system must always be performed by way of evaluation of the system specific function control gauges in the instrument cluster and/or messages on the Check Control display (ABS, DSC, and brake pad wear and brake fluid display)!

Functional check of the service brake:

Prior to the brake test, the service brake must be conditioned by braking 2 or 3 times from increased walking speed to vehicle standstill.

For vehicles with combustion engines, the engine must run to maintain the vacuum for the power assistance of the service brake. For the same reason, the driving readiness ("ignition") must be switched on with electrical vehicles to ensure the electrical vacuum generation.

EU and Germany:

Vehicle braking (z) with the service brake **at least 58 % of the authorized vehicle total weight**, instead of the previous 50 %.

Reference value for this minimum braking action **is**, according to ECE Directive 13H, is a **brake pedal operating force of max. 500 N**.

Note: For M1 vehicles with a first registration date prior to July 28, 2010, a minimum brake force of 50% continues to be valid!

Braking according to the guidelines listed above is defined as:

$$z = \frac{\text{Total of brake forces of all wheels at the wheel output}}{\text{Weight force of the vehicle (zGG)}} \times 100 (\%)$$

Example: BMW X3 F25: approved total weight (zGG.): 2300 kg.

Measured brake force values on brake test stand:

Service brake	Front	Rear
Left	435 daN	335 daN
Right	434 daN	336 daN

Evaluation of service brake:

$$z = \frac{1540}{2300} \times 100 (\%) = 66.96 \% \text{ is OK because greater than } 58\%$$

Note:

Since the vehicles to be tested usually do not indicate the approved total weight at the time of the test, and



the test stand rollers may prematurely switch off due to the lower axle weight before the possible higher brake forces are reached as a result of the wheel roll slipping limit, the determined total brake force is often below the total brake force that is required to meet the statutory minimum braking.

This may result in a false evaluation (not OK) even though the brake system is intact.

To prevent such a "mis-evaluation" and eliminate the need for a general vehicle load to the approved total weight, the vehicle manufacturers will provide **a maximum pedal force as reference value for minimum brake action** type and/or series-specific in the future. See table in Appendix 1.

To correspond to the actual conditions especially when checking on the brake test stand, the vehicle manufactures are enhancing the series-specific input specification values, which means the brake pedal forces, with additional **"test stand suitable" brake pedal forces**, in which the actual measurements must be performed.

These are usually low brake pedal force reference values that are generally in front of the banding point of the brake servo reference line.

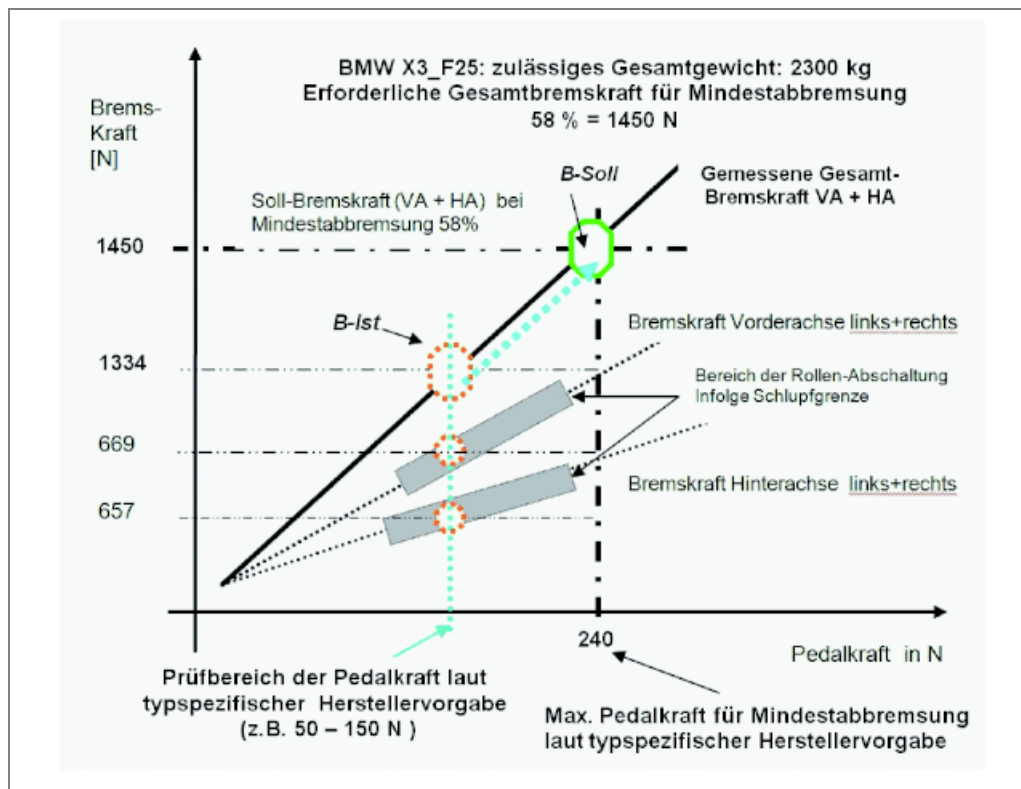
The brake force can thereby be measured in front of the blocking limit in most cases, which serves to preserve the tyres and provides a significantly more accurate approved right / left deviation in the upper test range.

In practice, this means:

When the measured total brake force "B Actual" is below the total value "B Target" for the required minimum braking due to premature shut down of the brake test stand or a vehicle test weight near the vehicle kerb weight, this actual value must be extrapolated on the line of the total brake force to the specified brake pedal force and then entered in reference to the approved total weight of the vehicle to be tested (see vehicle documentation). This new total value "B Target" will now be used to calculate the braking.

If this total brake value that was extrapolated to the specified maximum brake pedal force does not meet the required minimum brake force of 58%, the braking effect must be rated not OK.

The schematic graphic below clarifies this correlation:



Other statutory specifications EU and Germany:

Just as for vehicles first registered **before** 01.07.2012, the deviation of the wheel brake forces of each axle to each other may not exceed 25%.

Also valid for vehicles in Germany first registered from 01.07.2012 onwards:

Evaluation of the minimum brake force share of the front and rear axle in % to the total brake force of all wheels according to the vehicle manufacturer's specified values. See formulas below and type or series



specific manufacturer values according the table in Appendix 1.

Total front axle brake forces

1. Front axle share= x 100 (%)

Total brake force of all axles

Manufacturer specification:

The following calculation results from the previous example for the BMW X3:

435 daN + 434 daN

Front axle brake force share= x 100 (%) =56% is OK because greater than 51.3%

-

435+434+335

+336daN

Total rear axle brake forces

2. Rear axle brake share= x 100 (%)

Total brake force of all axles

Manufacturer specification:

The following calculation results from the previous example for the BMW X3:

335 daN + 336 daN

Rear axle brake force share= x 100 (%) =44% is OK because greater than 21%

435+434+335 +336 daN

General note:

This means that the official test of the service brake **absolutely requires the use of a brake pedal force measuring sensor.**

The manufacturers of brake test stands have been offering these items for many years as test stand accessory.

Examples are:



Position 1: MAHA, Haldenwang

Position 2: AHS, Bremen



02	02	0135/04000	210
- 04648		- 1881	
- 1661		01800 - 01800	
	00100		
147	002300	002300	
01080	01280		
01080	01280		
078	03000	074	
02400	0750	005	

The approved total weight of the vehicle must be derived from the registration Part 1 from column F1 or F2.

Since the law primarily requires that brake effect tests are performed on brake test stands, BMW Group vehicles **must be tested on roller test stands!**

Next, the statutory tolerance of the axle "right-left deviation, limit value max. 25%, must be determined in the upper range of the measured brake forces.

In addition, the minimum brake force shares must be determined separately for the front and rear axle in compliance with the additional German specifications and referenced to the manufacturer specifications.

General notes:

It is recommended to check the brakes as part of the manufacturer required vehicle inspection and **before** the official vehicle inspection according to the specified values indicated here.

To make work easier for the **referencing: Brake pedal force to brake force** we urgently recommend to have your test stand manufacturer set up an electronic measured value transmission from the brake pedal force measuring tool to the test stand computer.

The installation of a calculation program to determine the minimum total braking on the test stand computer to achieve the correct evaluation - especially when it is necessary to extrapolate the actual brake force in relation to the setpoint value at the corresponding brake pedal force - is also deemed absolutely necessary.

The integration of a database for the type specific vehicle specifications (brake pedal forces, front and rear axle brake shares) simplifies the overall brake test.

These specification will also be indicated in the technical data and/or repair instructions in the future as minimum values, which will only be updated and/or maintained model-specific there.

The test procedure for the mechanical or electrical operated parking brakes, and/or the regenerative valve for hybrid or electric vehicles are listed in the corresponding repair instructions.

In the event of specifications for the brake test that deviate from country authorities of EU states and/or newer issues of the German road traffic licensing regulations, or the application of manufacturer and/or type specific target data is prohibited, compliance with same is required.

In this case, we request that you will send the corresponding information to the publisher of this service information.

- Enclosure 1: Type specific specifications to test the service brake
- Enclosure 2: Manual calculation of braking when this is not supported by the test stand.



64 53 ... Instructions for desiccant insert replacement



Special tools required:

- 32 1 270

A desiccant insert that is in a correctly functioning, sealed heating and air conditioning system does **not** have to be changed at regular service-inspection intervals.

However, the dryer flask or desiccant insert must absolutely be replaced in the event of:

- contamination of the refrigerant with swarf (e.g. when the compressor is clamped).
- With depressurised and/or completely drained refrigerant circuit.
- With a refrigerant circuit, which was closed using special tool 32 1 270 but remains open for more than 24 hours.

The desiccant insert cannot be replaced in the following vehicles:

- 1-Series E8x, 3-Series E9x from 12/2008
- E84, E89
- 1-Series F2x, 3-Series F3x
- BMW i 01 without heat pump

In these vehicles, the condenser for the heating and air conditioning system must be replaced.

- BMW i 01 with heat pump

On this vehicle the low pressure battery must be replaced.



64 50 ... Instructions for handling R 134a refrigerant

Warning!

Although R 134a at normal temperature is non-toxic, non-flammable and not explosive in air in any mixture ratio, it is still essential to follow various safety precautions.

The filled refrigerant circuit of the A/C system is subject to excess pressure. When carrying out repairs on the air conditioning, it is absolutely essential to draw off the refrigerant.

Do not weld or solder on to filled A/C systems or in rooms into which R 134a may have leaked. Exposure to flames or high temperatures ($\geq 50\text{ }^{\circ}\text{C}$) may give rise to toxic decomposition products (fluorine gas). For this reason, do not smoke either.

R 134a must be drawn off, cleaned and returned to the air conditioning with a service station following the relevant operating instructions.

Avoid all contact with liquid or gaseous R 134a. Wear safety goggles and gloves when working on the refrigerant circuit. R 134a acting on the skin can cause frostbite. Rinse affected body parts thoroughly with cold water. If R 134a gets into your eyes, likewise rinse with plenty of water and, if necessary, remove contact lenses if worn. Then seek immediate medical attention. Likewise seek immediate medical attention if you experience problems after inhaling R 134a fumes.

As a gas, R 134a is colourless, odourless and heavier than air. If it enters the atmosphere, this may result in an imperceptible danger of asphyxiation or in cardiac palpitations, especially in workshop pits. Ventilate rooms adequately; if necessary, turn on installed extractor systems.

For a properly functioning air conditioning, it is essential to have the greatest possible levels of cleanliness when working on the air conditioning and the best possible evacuation (at least 30 minutes dehumidification from refrigerant circuit) before each filling of the air conditioning.

R 134a absorbs moisture very easily. Therefore, seal off opened pipes, condenser, evaporator, compressor and dryer flask immediately with plugs.

With exchange parts, the plugs may only be removed immediately before the lines are connected.

In the event of warranty claims, the used parts must be provided with seal plugs to be able to determine the cause of the damage.

If an air conditioning has been completely drained by leakage, accident or repair, the drier element must be replaced as excessive moisture may have entered the system.

Store filled refrigerant pressure cylinders in such a way that they are not exposed to direct sunlight or other heat sources (max. $45\text{ }^{\circ}\text{C}$). Also avoid exposing them to mechanical stress (e.g. by dropping).

In the event of fire, carbon dioxide (CO_2), extinguishing powder and a sprayed water jet are deemed to be suitable extinguishants. Cool reservoirs at risk with a sprayed water jet (risk of bursting!).

Important!

After each refilling of an air conditioning, check that protective caps of filling valves are hand-tight. They serve as additional seals.



64 50 ... Instructions for handling R1234yf refrigerant

Work on the refrigerant circuit may only be carried out by experts!

Avoid all contact with liquid or gaseous R1234yf. Wear protective goggles and gloves when working on the refrigerant circuit.

- Follow safety information for handling refrigerant R1234yf!

Warning!

Although R1234yf at normal temperature is non-toxic, non-flammable and not explosive in air in any mixture ratio, it is still essential to follow various safety precautions. **At higher temperatures, R1234yf is inflammable.**

As a gas, R1234yf is colourless, odourless and heavier than air. If it enters the atmosphere, this may result in an imperceptible danger of asphyxiation or in cardiac palpitations, especially in workshop pits. Ventilate rooms adequately; if necessary, turn on installed extractor systems.

Store filled refrigerant pressure flasks so that they are not subject to direct sunlight or other heat sources (at maximum 45 °C). Also avoid exposing them to mechanical stress (e.g. by dropping).

Do not weld or solder on to filled air conditioning systems or in rooms into which R1234yf may have leaked. Exposure to flames or high temperatures (≥ 50 °C) may give rise to toxic products of decomposition (hydrofluoric acid). For this reason, do not smoke either.

In the event of fire, carbon dioxide (CO₂), extinguishing powder and a sprayed water jet are deemed to be suitable extinguishing agents. Cool reservoirs at risk with a sprayed water jet (risk of bursting!).

If the protective caps on the filler valves are difficult to open, there is a risk of injury from leaking valve inserts (high pressure).

The filled refrigerant circuit of the A/C system is subject to excess pressure. Before carrying out repairs on the A/C system, it is absolutely essential to draw off the refrigerant.

- Before conducting repairs, check the actual pressure drop on the pressure gauge of the A/C service station

R1234yf must be drawn off, cleaned and returned to the A/C system using an A/C service station following the relevant operating instructions.

For a properly functioning A/C system, it is essential to have the greatest possible levels of cleanliness when working on the A/C system and the longest possible evacuation (at least 30 minutes dehumidification from refrigerant circuit) before each filling of the A/C system.

R1234yf easily absorbs moisture. Therefore, seal off opened pipes, air conditioning condenser, evaporator, air conditioning compressor and dryer flask immediately with seal plugs.

- If air conditioning has been completely drained by a leak, accident or repair, the desiccant insert must be replaced as excessive moisture may have entered the system.

With replacement parts, the plugs may only be removed immediately before the lines are connected. In the event of warranty claims, the old parts must be provided with plugs to be able to determine the cause of the damage.

Installation note:

After each refilling of an air conditioning, check that protective caps of filling valves are hand-tight. They serve as additional seals.



64 53 ... Instructions for replacement of air conditioning condensers and radiator/coolers

Attention!

Even when they are correctly installed or due to normal driving, radiators (oil cooler, radiator, charge air cooler) or air conditioning condensers may show slight impressions or deformations on their discs (1).

A slight sag with a large radius for the air conditioning condenser is also permissible.

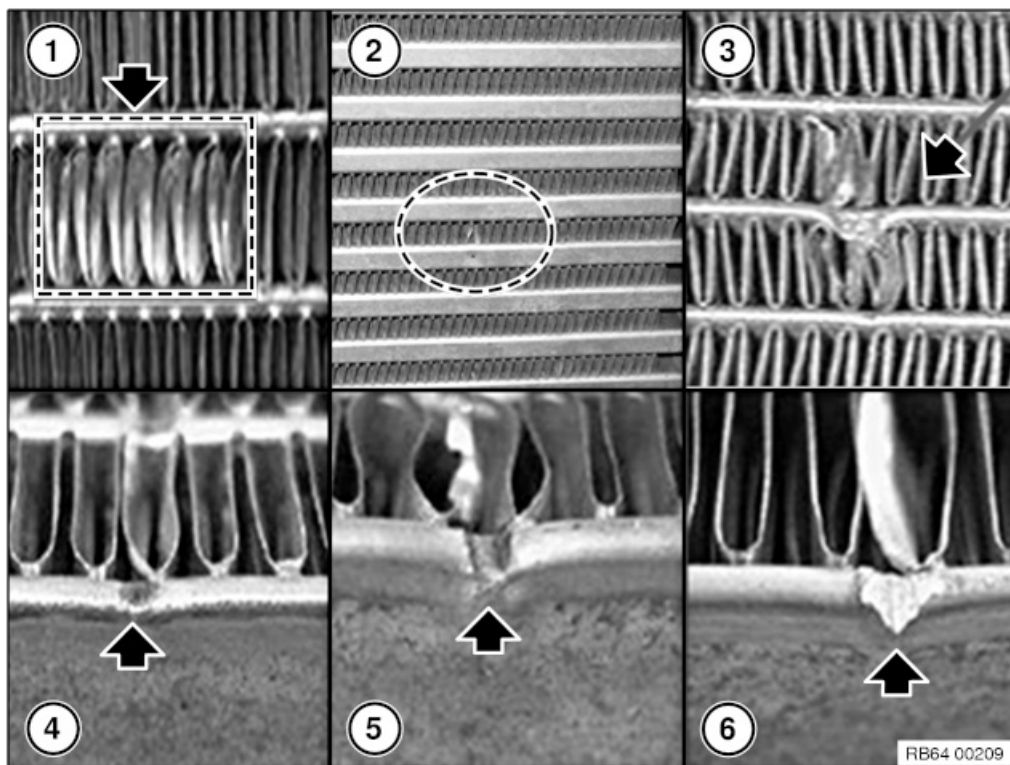
As long as tightness/function are not degraded and an adequate distance of a few mm between the radiator and air conditioning condenser remains in place, **this is not damage in either case.**

Radiators or air conditioning condensers are not to be replaced in these cases!

Note:

The deformations shown in Fig. (1) can be bent back with a standard fin comb..

Damage to lines carrying media or on the flat pipe require exchange of the radiator or air conditioning condenser (2-6).



Dryer flask (integrated in the air conditioning condenser):

Round dents/depressions are permitted.

The air conditioning condenser is not to be replaced in this case.



64 52 ... Notes on changing the air conditioning compressor, determining the amount of refrigerant oil (amount of refrigerant oil of new air conditioning compressor not known)



Note:

This procedure only applies if the **new air conditioning compressor does not have a label with the amount of refrigerant oil.**

A different procedure applies for air conditioning compressors with a label indicating the amount of refrigerant oil.



Attention!

Risk of damage!

Remove the air conditioning compressor without damaging and without the use of force!

Air conditioning compressors with plastic belt pulleys:

- Avoid impacts/knocks to plastic belt pulley (caused by tools, contact with base).
- Return faulty air conditioning compressors in their original packaging only and with sealed connected branches.



Attention!

In the event of a mechanical air conditioning compressor failure and the resulting ingress of chips into the refrigerant circuit, replace the following parts:

- Air conditioning compressor
- Air conditioning condenser
- Desiccant insert
- Line to the air conditioning condenser
- Refrigerant oil



The new air conditioning compressor is filled at the factory with refrigerant oil.

The amount of refrigerant oil in the new air conditioning compressor corresponds to the amount of refrigerant oil for the entire new and unfilled refrigerant circuit.

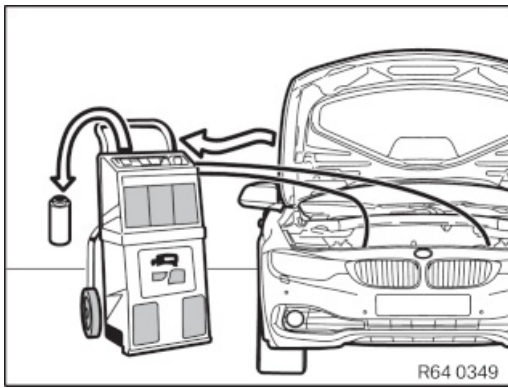


When replacing the air conditioning compressor it is absolutely essential to adapt the amount of refrigerant oil in accordance with the instructions below!

An adjustment of the amount of refrigerant oil is not required in the following case:

- Replacement of the complete refrigerant circuit.



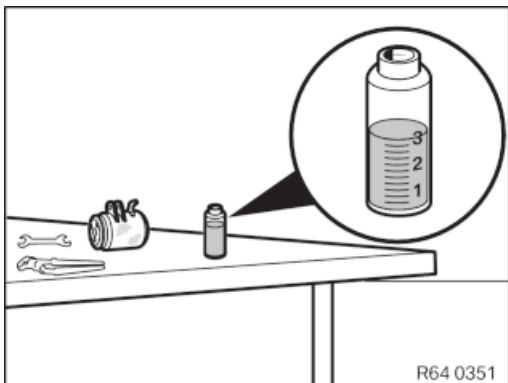


- Draw off A/C system.
- Note down the amount of refrigerant oil shown on the A/C service station display.

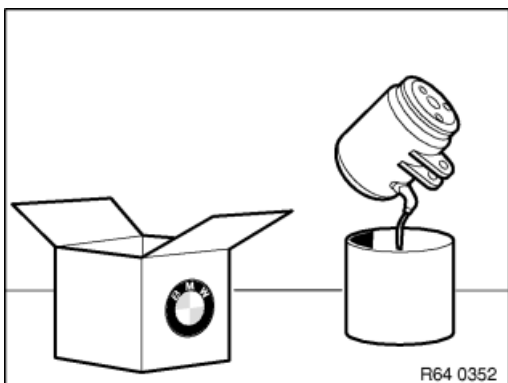
i When evacuating the air conditioning system, refrigerant oil is also extracted and collected in the oil separator of the A/C service station. This amount of refrigerant oil is displayed after the extraction of the air conditioning on the display of the A/C service station.



- Transfer all of the refrigerant oil remaining in the previous air conditioning compressor into a measuring cup via the oil filler plug.
- Turn the belt pulley during the filling process. This allows more refrigerant oil to flow out of the previous air conditioning compressor.

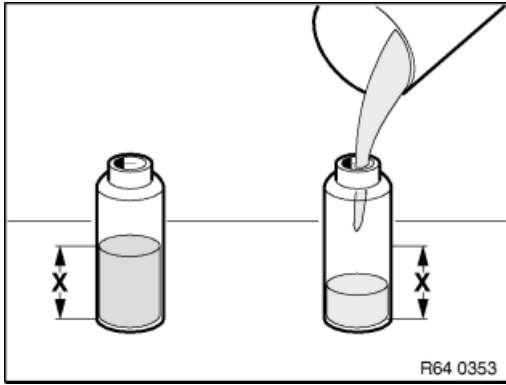


- Read the amount of refrigerant oil at the measuring cup.



- Open oil filler plug. Tightening torque 64 52 2AZ.
- Fill the entire contents of the new air conditioning compressor in a clean collecting vessel.





- Fill the same quantity of refrigerant oil (from the new air conditioning compressor), as was drained from the present air conditioning compressor, **+ 10 ml precautionary allowance** in a clean measuring cup and again fill it in the new air conditioning compressor . **At least but a total of 50 ml.**

Example:

20 ml read at measuring cup:

20 ml + 10 ml precautionary allowance = 30 ml < 50 ml

determined amount of refrigerant oil for new air conditioning compressor = 50 ml



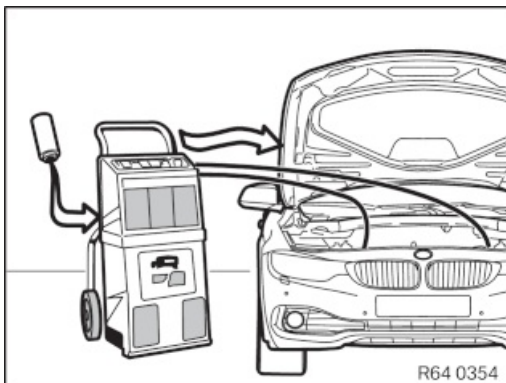
The drained new refrigerant oil can be filled into the expansion tank of the A/C service station after draining.



If the new, drained refrigerant oil is not filled straight away into the expansion tank of the A/C service station, it must be disposed of properly.



On account of its hygroscopic properties, refrigerant oil must not be stored in open collecting vessels.



- Reassemble the vehicle.
- Evacuate Air conditioning.
- Before filling the air conditioning with refrigerant, fill in the noted quantity of refrigerant oil previously drawn off, into the system.
- Fill A/C system.





Attention!

Risk of damage!

During initial operation of a new air conditioning compressor, it is absolutely essential to carry out the following breaking-in procedure.

Do not exceed idle speed.

Note:

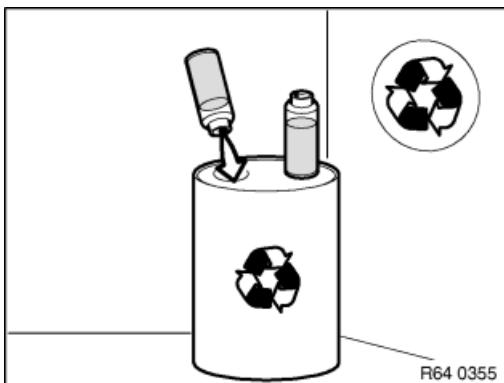
The breaking-in procedure for the new air conditioning compressor can be carried either manually or with the diagnosis system.

Manual:

- Switch off the air conditioning.
- Set all ventilation outlets in the instrument panel to "OPEN".
- Start engine and let it stabilise at idle speed.
- Set the blower output to a minimum of 75% of the maximum blower output.
- Switch on the air conditioning and allow the engine to run at idle speed for a minimum of 2 minutes.

Carry out the following service function with the diagnosis system:

- Body
- Heating and air conditioning functions
- Run-in protection for A/C compressor



- The refrigerant oil drawn off from the oil separator of the A/C service station and from the previous air conditioning compressor **must not be reused and must be correctly disposed of**.
- Observe country-specific waste disposal regulations.



Installation note:

If the refrigerant circuit is open for longer than 24 hours:

- Replace desiccant insert



**Attention!**

Specific to the country , 2 different refrigerants (R134a, R1234yf) are used.

Specific to the country, the vehicle and the year of manufacture 2 different refrigerant oils (ND-8, Sanden SP-A2) are used.

Before carrying out repairs on the refrigerant circuit, always determine which refrigerant/refrigerant oil is used in the vehicle!

Refrigerant: This information can be found on the **type plate** on the bonnet.

Refrigerant oil: This information can be found on the **type plate** on the front flap in vehicles with a production date from 2013.



**R1234yf refrigerant is used in the following countries:**

Observe notes on handling R1234yf refrigerant!

Europe				Asia	America
Belgium	Great Britain	Malta	Sweden	Israel	USA
Bosnia and Herzegovina	Ireland	Macedonia	Switzerland	Turkey	Canada
Bulgaria	Iceland	The Netherlands	Slovakia	India*	
Denmark	Italy	Norway	Slovenia	South Korea	
Germany	Croatia	Austria	Spain		
Estonia	Latvia	Poland	Czech Republic		
Finland	Liechtenstein	Portugal	Hungary		
France	Lithuania	Romania	Cyprus		
Greece	Luxembourg	Serbia			

*Only applies to vehicle models with Europe version. All other vehicle models have R134a.

Introduction of R1234yf refrigerant:

European countries listed in the table, Turkey and Israel:

- BMW i as of 09/2013
- from 07/2016, BMW, MINI, RR

USA and Canada:

- from 07/2016 BMW, BMW i, MINI

South Korea:

- from 11/2018 BMW, BMW i, MINI

The introduction date may vary slightly according to the specific country and model.

The refrigerant R134a will continue to be used **in all other countries**.

Observe notes on handling R134a refrigerant!





Refrigerant oil Sanden SP-A2 is used for both, R1234yf and R134a.

Observe notes on handling refrigerant oil!



Attention!

I01, I12 with production date up to 08/2014:

In the national-market version with R134a a wrong refrigerant oil is present on the type plate

Always use Sanden SP-A2

(Part number of Sanden SP-A2: 2 339 920)

Attention!

Only vehicles with a production date from 09/2013 and **R1234yf** refrigerant/Sanden **SP-A2** refrigerant oil can be filled using the A/C service station for **R1234yf**.

In addition to vehicles with a production date from 09/2013, also all previous vehicles **without the electric A/C compressor** with **R134a** refrigerant and both **ND-8** and Sanden **SP-A2** refrigerant oil can be filled using the A/C service station for **R134a**.

Exception:

BMW i and hybrid vehicles (with an electric A/C compressor) that are filled with **R134a** refrigerant/Sanden **SP-A2** refrigerant oil. These vehicles must be injected with Sanden **SP-A2** refrigerant oil.

When filling the refrigerant circuit with R134a, always ensure you use the correct, vehicle-specific refrigerant oil type!

The previous ND-8 refrigerant oil must not be mixed with Sanden SP-A2 refrigerant oil!

In other words, the refrigerant oil ND-8 must not be filled in refrigerant circuits which were filled with Sanden SP-A2 in the factory.

Sanden SP-A2 refrigerant oil may be mixed with ND-8 refrigerant oil in vehicles without an electric A/C compressor.

In other words, the refrigerant oil Sanden SP-A2 must be filled in refrigerant circuits which were filled with ND-8 in the factory.

However, this is permitted **only** in vehicles **starting from F-series**.

Note the overview of the refrigerant oil to be filled.

To prevent inadmissibly mixing the different refrigerant oil types, rinse the A/C service station hoses after each drawing off/filling procedure!



**Warning!**

Danger of injury!

Refrigerant circuit is under high pressure! Work on the refrigerant circuit may only be carried out by experts!

Draw off refrigerant without fail **BEFORE** all repair work on the refrigerant circuit.

The refrigerant circuit is depressurised **AFTER** drawing off.

- The pressure gauge on the A/C service unit must be checked for the actual pressure drop prior to repair work.

It is absolutely essential to read and observe the relevant operating instructions for the A/C service unit used!

At high temperatures, R1234yf is inflammable!

**Protective measures/rules of conduct:**

- Wear safety goggles
- Wear oil-resistant protective gloves
- Do not smoke!
- Observe country-specific safety regulations.

**First aid measures:**

- Eye contact: In the event of contact with the eyes, rinse immediately with plenty of running water and consult an ophthalmologist.
- Skin contact: In the event of contact with skin, remove affected clothing immediately and rinse with plenty of water.
- After inhalation: If refrigerant vapours are inhaled in greater concentrations, remove the person affected to an area of fresh air and keep them under supervision. Call for a doctor. If breathing problems are experienced, breathe additional oxygen. If the person affected is breathing with difficulty or has stopped breathing, incline the person's head at the neck and administer the kiss of life.



00 11 500 Checking/topping up oil level in automatic transmission (AISIN)N18 N16



Special tools required:

- 24 4 240



Important!

Use only the approved automatic transmission oil in this automatic transmission.

Failure to comply with this requirement will result in serious damage to the automatic transmission!

Installation note:

Details of approved oil grade:

refer also to adhesive label on transmission oil sump.



Note:

Level out oil level in automatic transmission via overflow connector.



Necessary preliminary tasks:

Remove underbody protection.

On vehicles with hydraulic steering gear:

Remove heat shield from hydraulic steering gear.

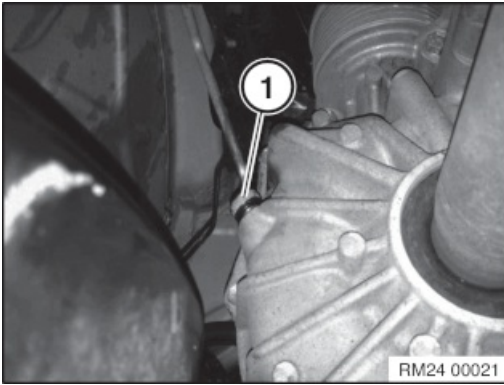
Tightening torque 32 41 12AZ.



Note:

Special tool 24 4 240 must be shortened to overall length of 36 mm.





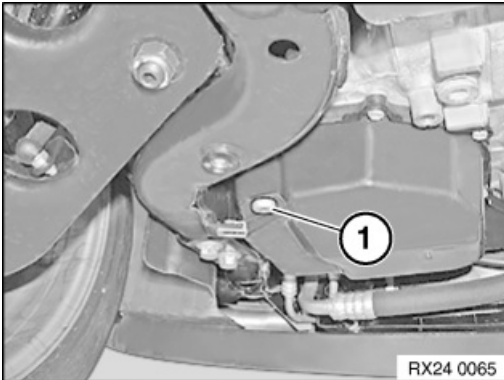
Move selector lever to "P" position.

The vehicle must be horizontal and secured against rolling off.

Connect BMW diagnosis system.

Release oil filler plug (1) using special tool 24 4 240 .

Tightening torque 24 11 2AZ.



Top up transmission oil. (Transmission oil has been drained)

Remove M10 oil drain plug (1) from transmission oil sump.

Tightening torque 24 11 1AZ.

Pour in automatic transmission fluid through oil filler plug until oil emerges at oil drain plug.

Start engine and run at idle speed.

Check whether ATF emerges at M10 oil drain plug.

If not, continue to add ATF.

Actuate footbrake and at idle shift through all gears "P" to "D" twice for more than 2 seconds.

Then move switch to "P" position.

Again check whether ATF emerges at M10 oil drain plug.

Check the temperature of the automatic transmission fluid with the BMW Diagnosis System.

Increase temperature of automatic transmission fluid to 35 ... 45 °C.

Top up automatic transmission fluid until it flows over.

Screw in oil filler plug and oil drain plug.

Tightening torque 24 11 1/2AZ.

Installation note:

Replace sealing rings.

Check oil level (oil temperature must be between 35 and 45 °C):

Open oil filler plug.

Slacken oil drain plug (1).

Tightening torque 24 11 1/2AZ.

Start engine and run at idle speed.

Unscrew oil drain plug.

Check whether ATF emerges at oil drain plug (1).

If not, pour in ATF up to oil filler plug.

Top up automatic transmission fluid until it overflows at oil drain plug.

Actuate footbrake and at idle shift through all gears "P" to "D" twice for more than 2 seconds.

Move switch to "P" position.

Check oil level again.

Seal screws when the oil emerges slightly from the drain plug.

Tightening torque 24 11 1/2AZ.



**Warning!**

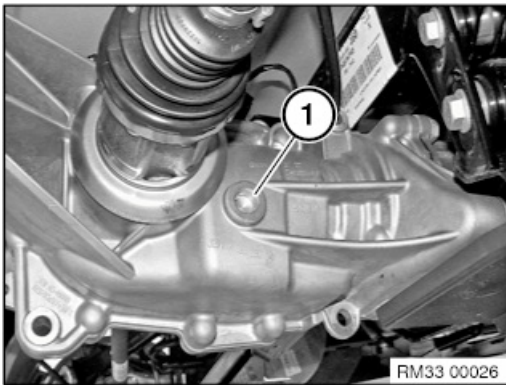
Danger of poisoning if oil is ingested/absorbed through the skin!

Risk of injury if oil comes into contact with eyes and skin!

Important!

Risk of damage!

To avoid serious damage to the rear axle final drive, it is essential to use only approved gearbox oils in the rear axle final drive.



Open screw plug (1).

Check oil level.

If necessary, pour in final drive oil up to lower edge of opening for screw plug (1).

Installation note:

Replace screw plug (1) with O-ring.

Tightening torque 33 11 1AZ.



**Recycling:**

Catch and dispose of escaping transmission oil.

Observe country-specific waste disposal regulations

**Note:**

Gearbox is at normal operation temperature.

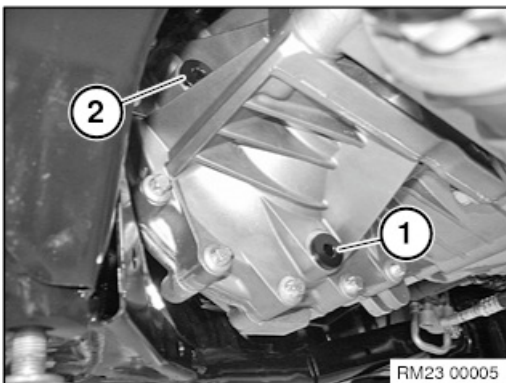
Important!

Use only the approved transmission oil.

Failure to comply with this instruction will result in serious damage to the transmission.

Capacity, refer to MINI Operating Fluids.

The vehicle must be parked on a level surface in the workshop to fill the transmission with oil.



Unscrew oil drain plug (1) and allow oil to flow out completely.

Clean oil drain plug and reinstall.

Tightening torque 23 00 1AZ.

Unscrew filler/fluid level monitoring connector (2) and fill gearbox until oil overflows. Allow excess oil to drain and reinstall filler/fluid level monitoring connector.

Tightening torque 23 00 1AZ.



00 Danger of injury if oil comes into contact with eyes and skin



Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin



Protective measures/rules of conduct:

- Wear safety goggles.
- Wear oil-resistant protective gloves.
- Observe country-specific safety regulations.



First aid measures:

- Eye contact: Immediately rinse out eyes with lots of water and for at least 15 minutes. In the case that it is available, use an eye wash bottle. If eye irritation persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

Note: Do not use solvents/thinners.



**Special tools required:**

- 2 410 242
- 11 0 222



- Read out fault memory of DME engine management module
- Check stored faults
- Rectify faults
- Delete fault memory

**Attention!**

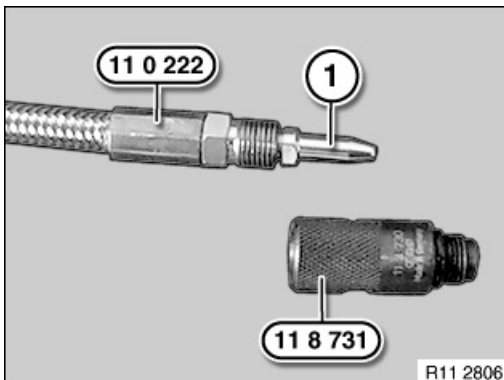
High tension - mortal danger!

Disconnect power supply to ignition coils.

Read and comply with notes on compression pressure check.

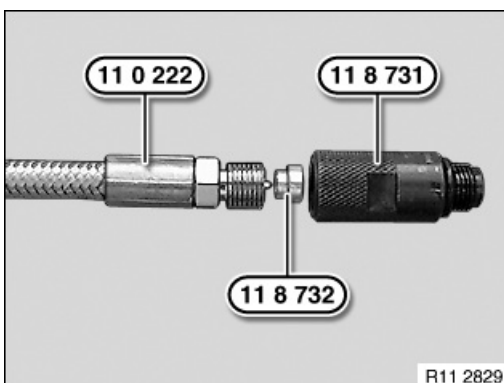
**Necessary preliminary tasks:**

- Remove spark plugs.



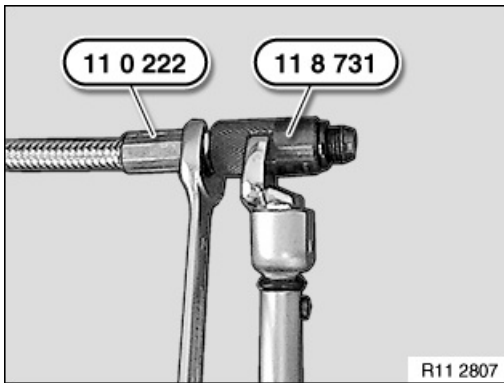
Unscrew tip (1) from special tool 11 0 222. **Attention!**

Then check the Schrader valve that is now visible for secure seating.

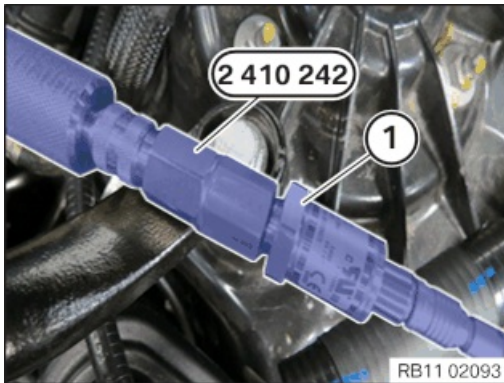


Prepare special tool 11 0 222 in conjunction with 11 8 732 and 11 8 731.



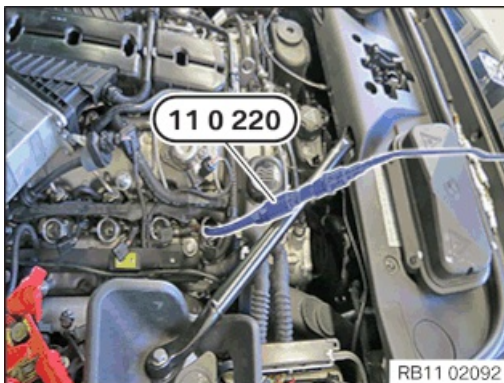


Screw special tool 11 0 222 onto special tool 11 8 731 to 10 Nm.



Connect special tool 2 410 242 to special tool 11 0 222 with the bayonet fitting.

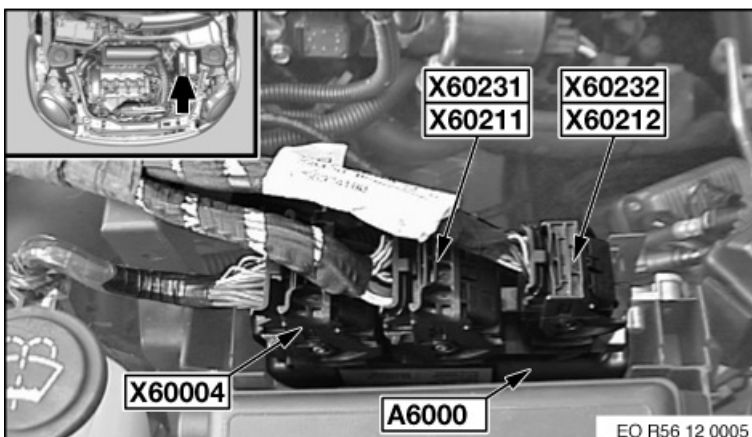
Screw in the 100-bar sensor (1) on the special tool 2 410 242 hand-tight. Connect 100-Bar sensor (1) with the Integrated Measurement Interface Box.



Screw special tool 11 0 222 by hand into the spark plug thread.

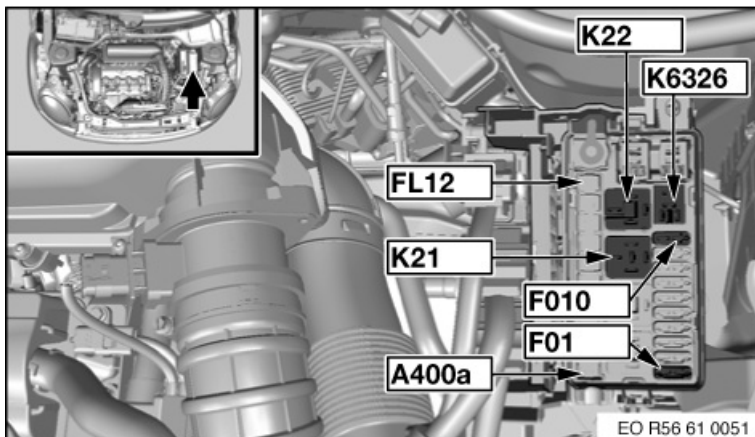
1. Connect vehicle with diagnosis tester.
2. Select service function "Check compression of all cylinders".
3. Observe diagnosis instructions.

Illustration: N74.



Disconnect connector A46*6B.





Remove relay K21 from slot.



Compression check, electronic.

Follow diagnosis instruction.



Assemble engine.

Delete the fault memory.



00 Danger of injury if oil comes into contact with eyes and skin



Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin



Protective measures/rules of conduct:

- Wear safety goggles.
- Wear oil-resistant protective gloves.
- Observe country-specific safety regulations.



First aid measures:

- Eye contact: Immediately rinse out eyes with lots of water and for at least 15 minutes. In the case that it is available, use an eye wash bottle. If eye irritation persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

Note: Do not use solvents/thinners.



**Danger of poisoning!**

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

**Protective measures/rules of conduct:**

- Fill oil in appropriately marked containers only.
- Do not pour oil in drinking vessels (beverage bottles, glasses or cups).
- Observe country-specific safety regulations.

**First aid measures:**

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.



Engine identification

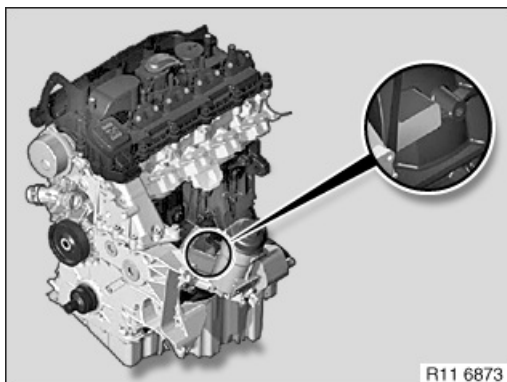


Engine number at the marked surface.

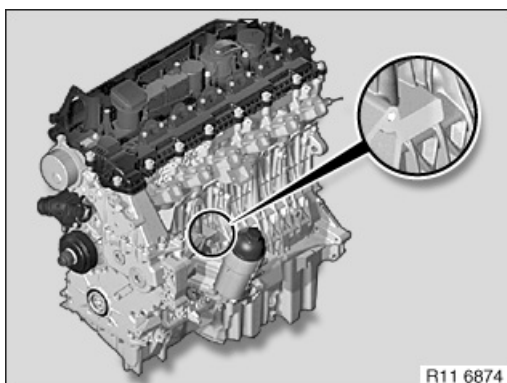
Replacement drives are already assigned a number containing the identification and engine number at the factory.

The old drive number must be imprinted for replacement crankcases.

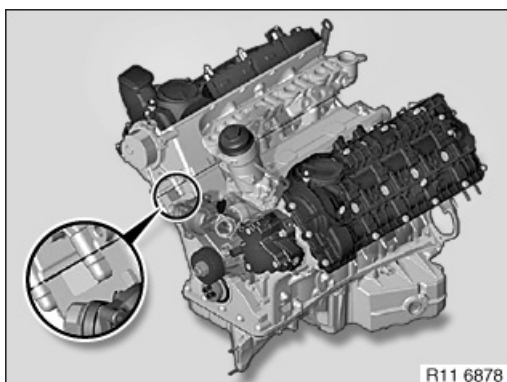
Magnesium crank cases feature a label, the engine number does not need to be embossed.



M47 / M47TU / M47T2

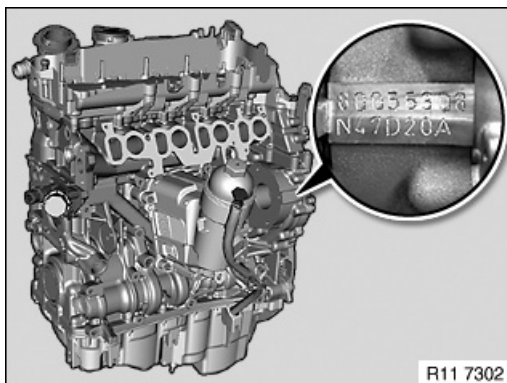


M57 / M57TU / M57T2

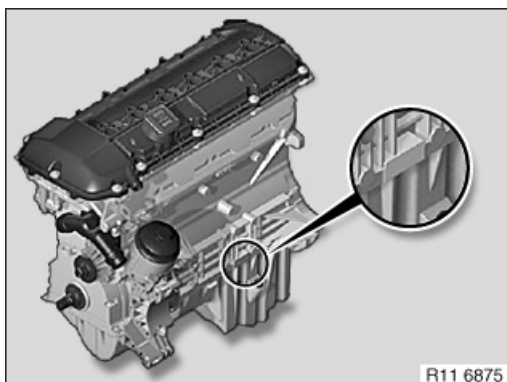


M67 / M67TU

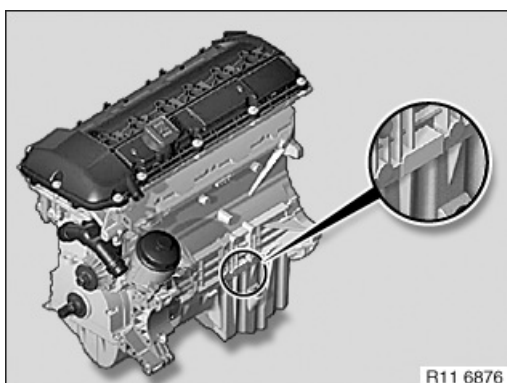




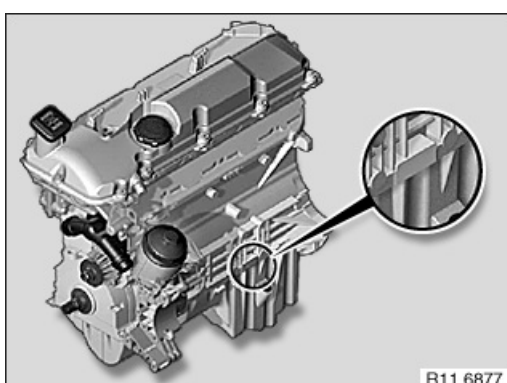
N47 / N47S / N47C / N47T / N57 / N57S / N57T



M52 / M52TU

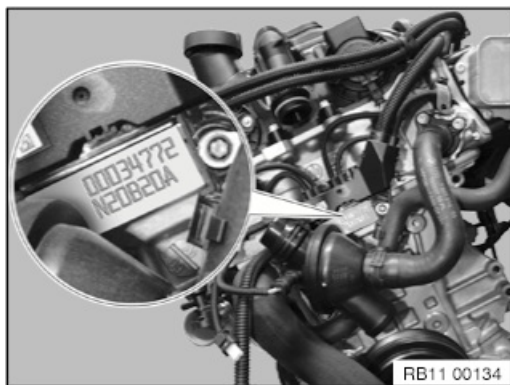


M54

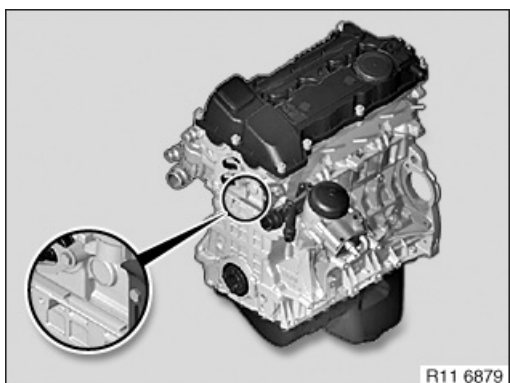


M56

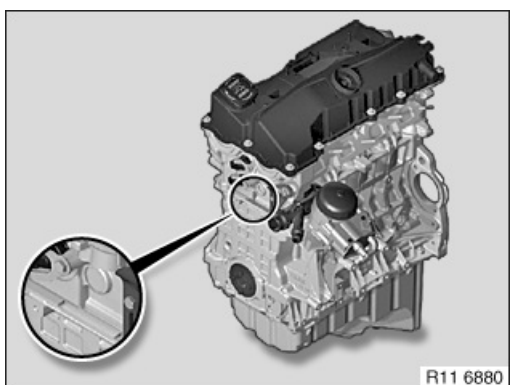




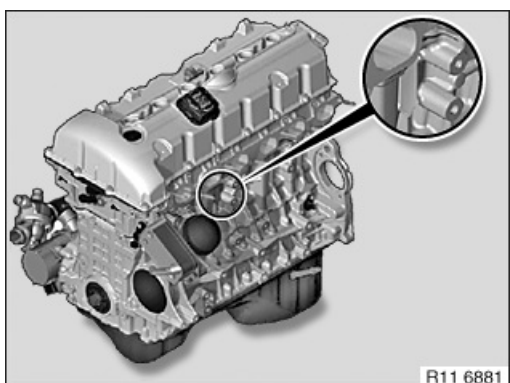
N20 / N26



N40 / N45 / N45T / N43

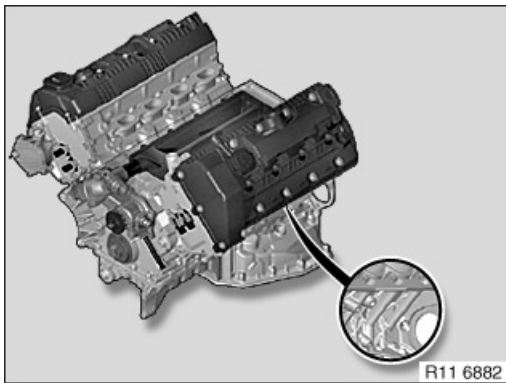


N42 / N46 / N46T

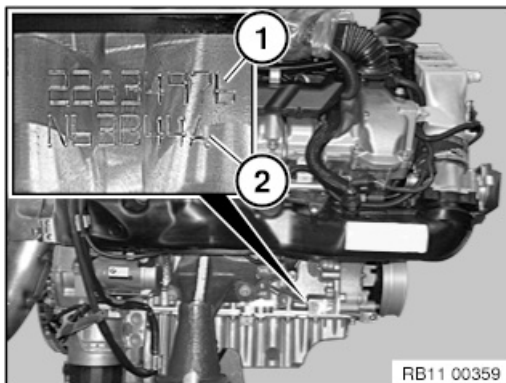


N51 / N52 / N52K / N52T / N53 / N54 / N55





N62 / N62TU



Position (1) engine number.

Position (2) engine code letters.

N63, N63O1, N63O2

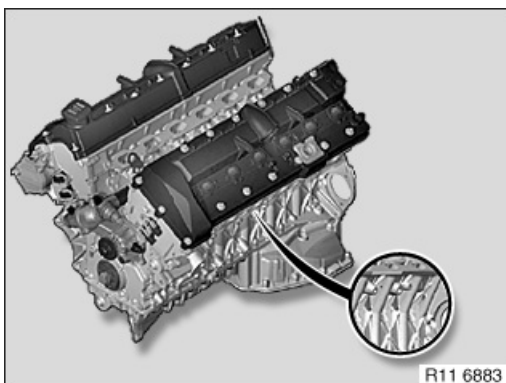
S63

N74, N74O1,

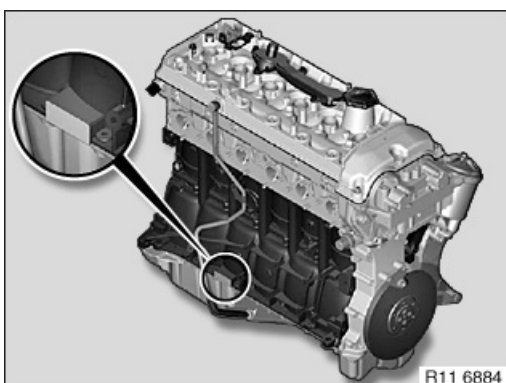
S63T0 to engine number 2001 0052 on right side cyl. 1-4.

S63T0 from engine number 2001 0053 on left side cyl. 1-4.

E72 Vehicles must be imprinted on the left side cyl. 5-8.

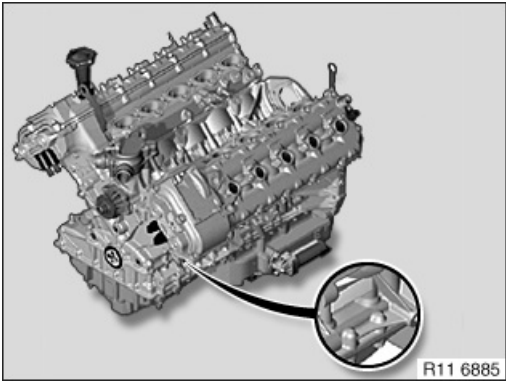


N73



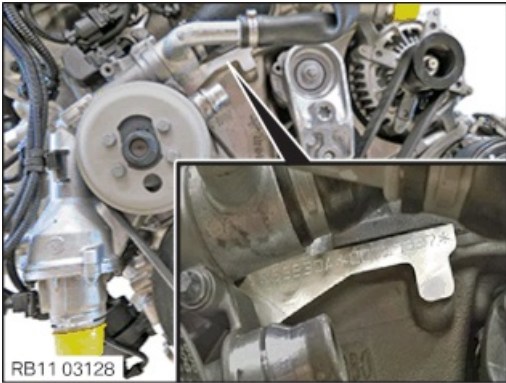
S54





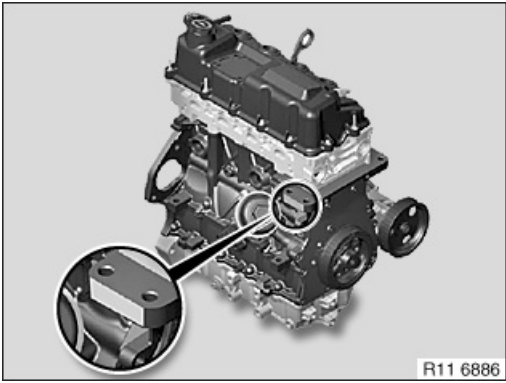
S85 / S65

R11 6885



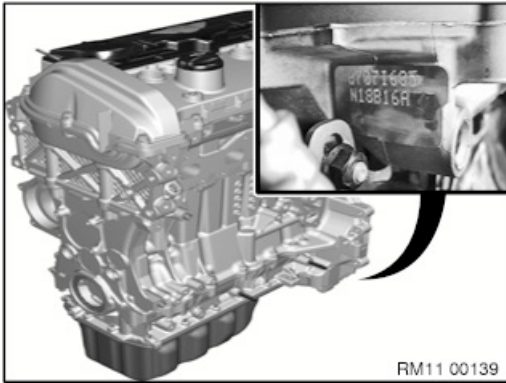
S55

RB11 03128



W10 / W11

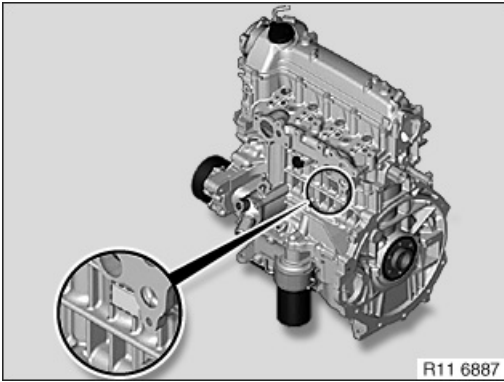
R11 6886



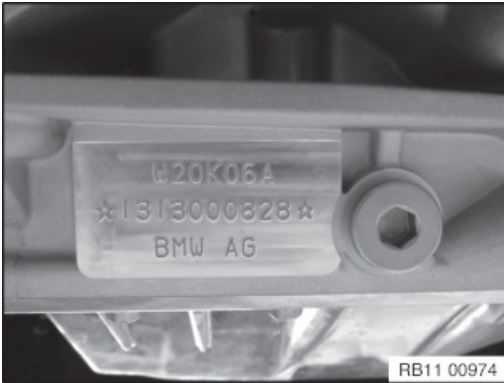
W16

RM11 00139

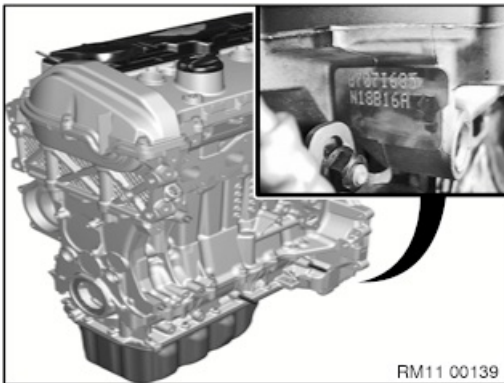




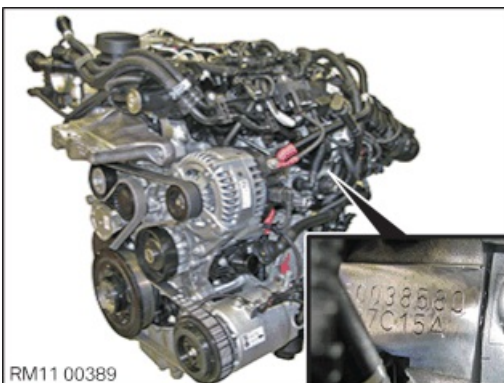
W17



W20

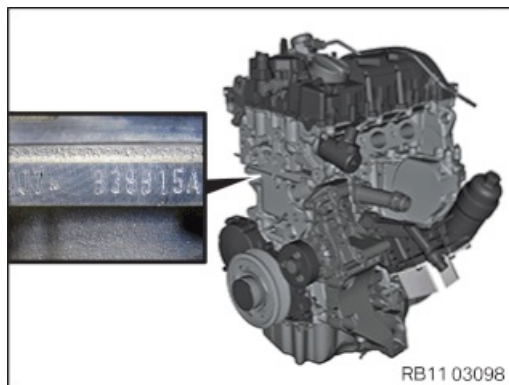


N12 / N13 / N14 / N16 / N18

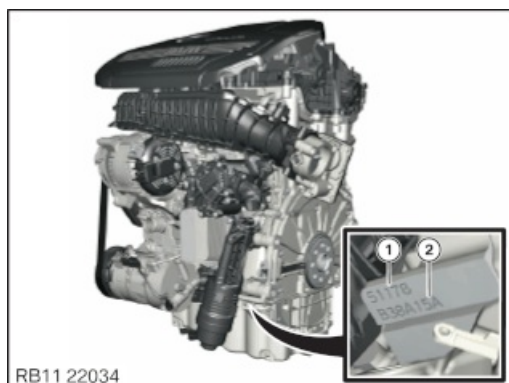


B37 / B38A / B47 / B48A
in the area of the oil sump

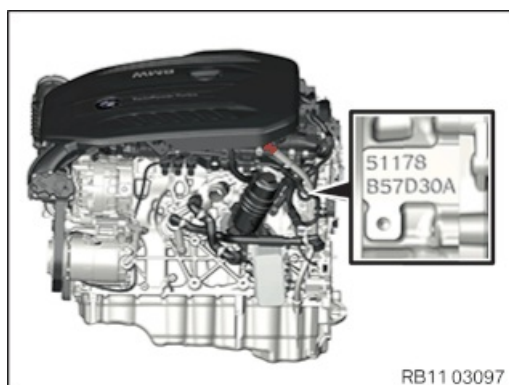




B38B / B48B



B38



B57



B58



Assemble engine.





Procedure for engine oil consumption measurement, see following documents:

- Engine oil consumption measurement (all without S85)
- Engine oil consumption measurement (only S85 with one oil drain plug)
- Engine oil consumption measurement (only S85 with two oil drain plugs)
- Record on oil consumption measurement



11 00 ... Engine oil service (N18)



Warning!

Risk of scalding!

Coolant temperature must not exceed 60°.

In the event of excess temperature, the engine must cool down.



Attention!

The cooling system must be depressurised for safety reasons.

Open radiator cap wearing suitable protective clothing.

It is essential to adhere to the exact capacities specified.

Overfilling the engine with engine oil will result in **engine damage**.

Test period and drip-off time must be observed.



Necessary preliminary work:

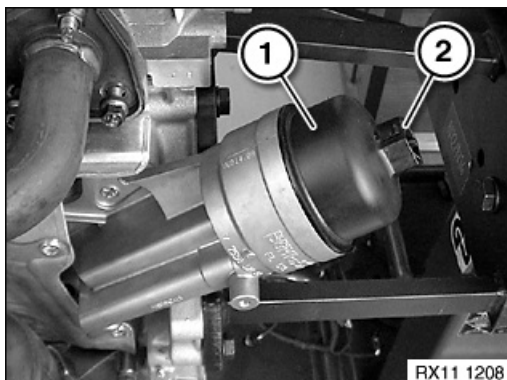
- Release coolant expansion tank and place to one side



Recycling:

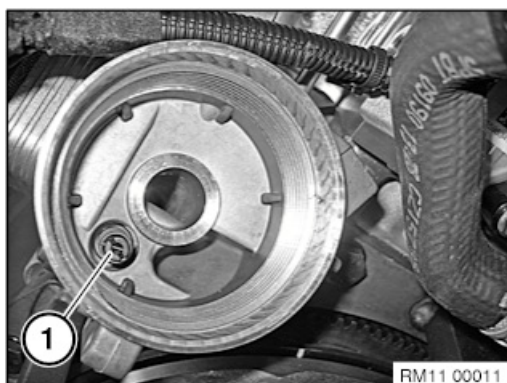
Catch and dispose of used oil in a suitable collecting vessel.

Observe country-specific waste disposal regulations.



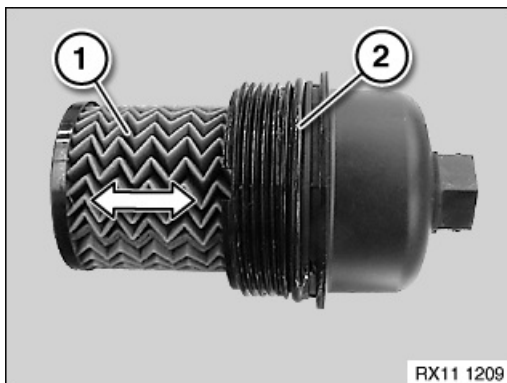
Undo oil filter cover (1) at hexagon head (2). *Note:*
Slowly open oil filter cover.

If necessary, catch escaping engine oil in a cloth.



Check the freedom of movement of the non-return valve (1).





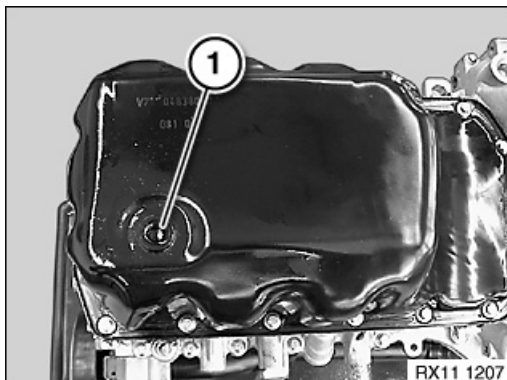
Remove and insert oil filter element (1) in direction of arrow.

Replace O-ring (2).

Installation note:

Apply thin coat of engine oil to O-ring (2).

Tightening torque: 11 42 1AZ.



Remove oil drain plug (1). *Installation note:*

Renew the sealing ring.

Tightening torque: 11 13 1AZ



Assemble engine.

Checking engine oil level:

- Park vehicle on a horizontal surface.



11 Equipment recoding special tool number of the transverse member for fixing the engine in the installation location

Equipment recoding from 00 0 200 to 00 6 0 000

Designation	Special tool new	Special tool previous
Cross-member, previous	---	00 0 200
Cross-member, new	00 6 000	---
Mounting bridge	00 6 001	00 0 201
Spindle with hook	00 6 002	00 0 202
Extension	00 6 003	00 0 203
Adapter support	00 6 004	00 0 204
Extension	00 6 005	00 0 205
Chain with hook	00 6 006	00 0 209
Set of supports	00 6 010	00 0 206
Set of supports	00 6 020	00 0 207
Set of supports	00 6 030	00 0 208
Connector	00 6 031	---
Profile strip (2 x)	00 6 032	---
Supports (4 x)	00 6 033	---
Set of supports	00 6 040	---
Profile strip	00 6 041	00 0 451
Supports (2 x)	00 6 042	00 0 452
Supports, short (2 x)	00 6 043	---
Set of supports	00 6 050	---
Profile strip (2 x)	00 6 051	---
Supports, short (2 x)	00 6 052	---
Supports, long (2 x)	00 6 053	---
Support, long	00 6 060	---
Supports (2 x)	00 6 070	---



11 00 ... **Handling components after flood damage**

Flood damage can occur if the permissible fording depth of a vehicle is exceeded. Ingress of water can cause damage to the engine (water shock) or components.

Because dirt particles generally enter into the component with the water (e.g. starter motor, wiring harness), the components need to be thoroughly inspected.

Residual moisture in the components leads to corrosion (increased contact resistance in the component), which can lead to a component failure at a later time.

If water ingress into the electrical components cannot be ruled out, it is recommended to replace the component to ensure correct functioning through the vehicle lifetime.



Mounting engine on assembly stand (N18)



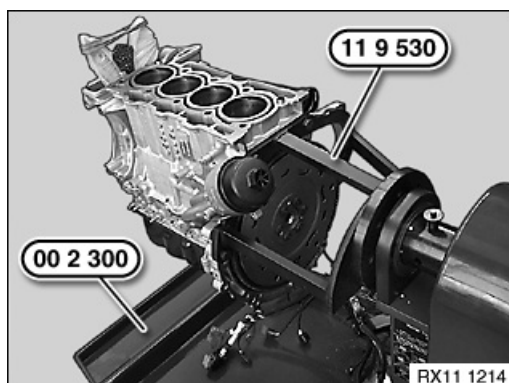
Special tools required:

- 00 2 300
- 11 9 530



Necessary preliminary work:

- Remove engine.



Screw the engine or engine block onto special tool 11 9 530 .

Use special tool 11 9 530 to mount engine on special tool 00 2 300 .



11 00 ... Overview of consumables (Electronic Parts Catalogue)

1.0 Sealing compound for **injection**.

	Repair instructions (engine)	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
1.1	S55, S65, S85	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound
1.2	S55, S65, S85	Loctite 193140 liquid sealing compound	83 19 0 439 030	Sealing between crankcase upper and lower halves
1.7	W20	Dow Corning liquid sealing compound	07 58 0 397 777	Sealing between crankcase upper and lower halves Sealing of oil sump

2.0 Sealing compound for **application**.

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
2.1	M41, M47, M47TU, M47T2, M50, M51, M52, M52TU, M54, M57, M57TU, M57T2, M60, M62 N12, N14, N16, N18 N20, N26 N40, N42, N45, N45N, N46, N46N, N43, N47, N47top, N47C N47D1 N51, N52, N52N, N53, N54, N55, N57, N57T, N62, N62TU, N63, N63O1 N73, N73H, N74 S14, S38, S50, S52, S54, S62, S65, S85	Drei Bond 1209 liquid sealing compound	07 58 9 062 376	For sealing junction points on crankcase
2.2	N12, N13, N14, N16, N18, N20, N26, N40, N42, N43, N45, N46, N51, N52, N53, N54, N55 W10, W11, W16,	Loctite 5970 liquid sealing compound	83 19 0 404 517	Sealing between crankcase upper and lower sections.
2.2	N47top, N47D1, N47C1 N57D1 N57S1, B32 ,B36 ,B37 ,B38 ,B42 ,B46 ,B47 ,B48 ,B57 ,B58	Loctite 5970 liquid sealing compound	83 19 0 404 517	Timing case cover sealing, oil sump, coolant pump, component carrier.
2.3	N12, N14, N16, N18 W16	Loctite 648 liquid sealing compound	07 58 9 067 732	Sealing between the seal plug and crankcase



2.4	N12, N13, N14, N16, N18 W16	Loctite 121078 liquid sealing compound	83 19 2 223 765	Sealing between cover sleeve and crankcase
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3.0 Cleaning agent.

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
3.1	N12, N13, N14, N18, N20, N26, N45, N46, N45T, N46T, N43, N51, N52, N52Kp, N52TU, N53, N55, N63, N63S, N63 Hybrid, N63O1, N63O2 N73, N74 B37, B38 B47, B48, B58	Cold cleaner (chlorine free)	83 19 0 026 956	Cleaning assemblies, washing engine
3.2	M47, M47T1 M47T2, M57 M57T1, M57T2 N47 K/U/O/T 0/1 N47C	Universal cleaner	83 19 2 360 981	Clean intake pipe.
3.3	All	Brake cleaner	83 19 2 365 214	Clean.

4.0 Lubricant for application.

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
4.1	N12, N13, N18, N20, N26, N42, N46, N46TU, N51, N52, N52KP, N52TU, N55, N62, N62TU, N63O0, N63O1, N63O2, N73 S55, S63T0 B38, B48, B58	Lubricating grease Longtime PD1	83 19 2 160 340	For greasing the splined shaft on actuator drive/gearing of intermediate shaft.
4.2	M47, M47TU, M47T2, M57, M57TU, M57T2,	High-temperature assembly paste	83 23 0 309 003	For greasing the thread on the exhaust turbocharger.
4.3	N12, N13, N14, N16, N18 N20, N26, N40, N42, N45, N45TU N46, N46TU, N43. N51, N52, N52Kp, N52TU, N53, N54, N55. N62, N62TU, N63O0, N63O1, N63O2 N73, N73H, N74. S63T1, S65, S85. B38, B48, B58	High temperature paste	83 19 2 158 851 83 19 2 158 852	For greasing the threads on the oxygen sensors.



4.4	N47, N47O1 N47C1, N47T N47D1 N57 N57D1 N63O0, N63O1, N63O2 S63, S63T0	Copper paste	81 22 9 400 794	For greasing the double hex head bolt on the exhaust turbocharger. For greasing the central bolt on the VANOS gear.
4.5	M47, M47TU, M47T2 M57, M57TU, M57T2 N47, N47O1 N47C1, N47T N47D1 N57 N57D1	High-temperature grease (UrethynE2).	83 23 0 441 070	For greasing the injectors or injector shafts. Solenoid valve and piezo injector.
4.6	N47T0, N47T1 N57T0, N57T1, N57S1 B47T0,	Assembly paste	83 29 9 407 778	For lubricating the O-rings of the pressure pipes. Multistage turbocharging assembly.
4.7	W20	Assembly paste, grease	No longer greased.	For greasing the torsion splined shaft.
4.8	N63O1, N63O2	Assembly paste, grease	83 23 9 407 778	For greasing the central bolt on the crankshaft.
4.9	W20	Assembly paste, grease	83 23 9 407 778	Grease O-ring on alternator.

5.0 lubricant for **filling**

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
5.1	M47, M57	Exhaust turbocharger additive	83 19 2 362 168	For filling the exhaust turbocharger after the renewal.
5.2	B32, B36, B37, B38, B42, B46, B47, B48, B58	Exhaust turbocharger additive, petrol MSP	83 19 2 457 276	For filling the exhaust turbocharger after the renewal.

6.0 Lubricants to loosen locked **screw connections**.

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
6.1	M47, M47TU, M47TU2, M57, M57TU, M57TU2. N47, N47C, N47D1, N57, N57D1, N57S1 W16, W17, B37, B47, B57	Brunox lubricating grease	83 23 0 418 567	For releasing the glow elements.
6.2	E89 F10, F11.	Brunox lubricating grease	83 23 0 418 567	For releasing and tightening the screw connection of the rubber mounts.

7.0 Leak detection spray and contact spray

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
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7.1	Petrol: N13, N20, N26, N54, N55 B38, B48, B58 Diesel fuel: M47, M47TU, M47TU2, M57, M57TU, M57TU2. N47, N47C, N47D1, N57, N57D1, B37, B47	Leak detection spray	83 19 9 407 861	Check charge air path for tightness. Example: leakage on charge air hose or charge air cooler.
7.2	S55	Contact spray	81 22 9 400 208	For cleaning and protecting of electrical plug connections.

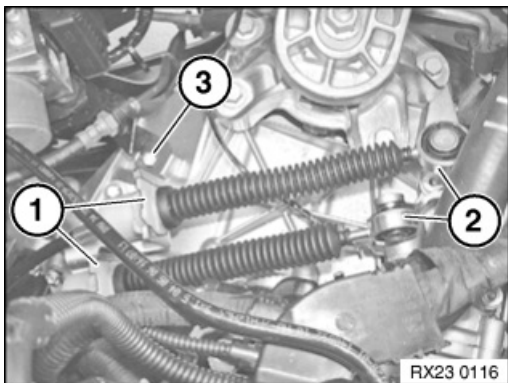


**Special tools required:**

- 11 0 260
- 13 5 162

**Necessary preliminary tasks:**

- Remove exhaust system.
- Drain engine oil.
- Disconnect battery earth lead.
- Disconnect the positive battery cable.
- Disconnect the connector at the compressor.
- Remove propeller shaft (only all-wheel drive).
- Remove both drive shafts.
- Remove air cleaner housing.
- Remove fan cowl with electric fan.
- Detach all coolant hoses from engine.
- Detach vacuum line from brake servo.
- Remove complete front panel

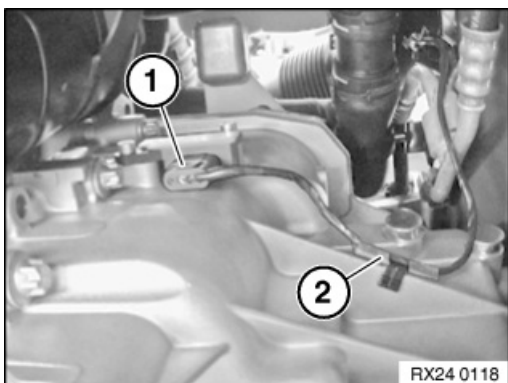


Disconnect cables to shift the gearbox.

Release clips on stop/holder (1).

Unlock protective plates.

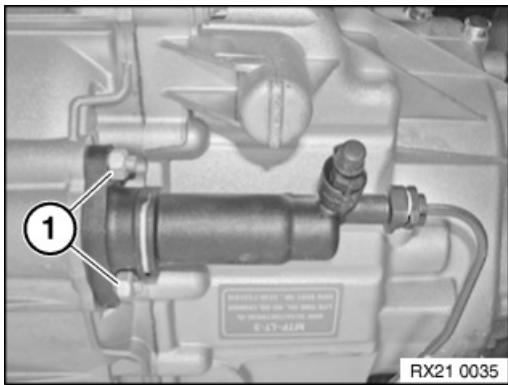
Detach cable (2) from ball joint.



Disconnect plug connection (1) on zero gear sensor.

Detach cable (2) with holder from transmission.





Note:

Pressure line of clutch slave cylinder remains connected.

Important!

Slowly relieve tension on clutch slave cylinder otherwise air may be drawn in through sealing sleeve.

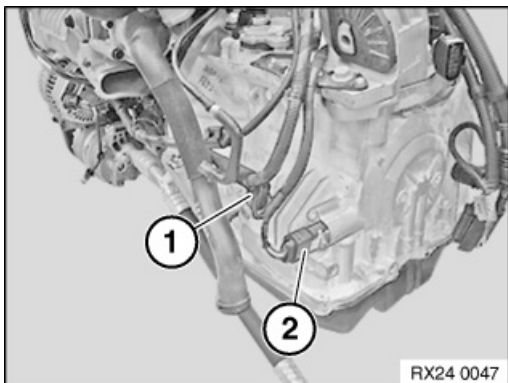
If possible, do not deflect push rod of clutch slave cylinder.

A deflection of the push rod caused by removal will cause easy escape of fluid. This escape of fluid does not mean that the clutch slave cylinder is damaged.

Replacement is therefore not necessary!

Release nuts (1) and remove clutch slave cylinder.

Tightening torque 21 52 2AZ.



Automatic transmission only

Disconnect the multiple pin connector (1/2) of the transmission control unit.

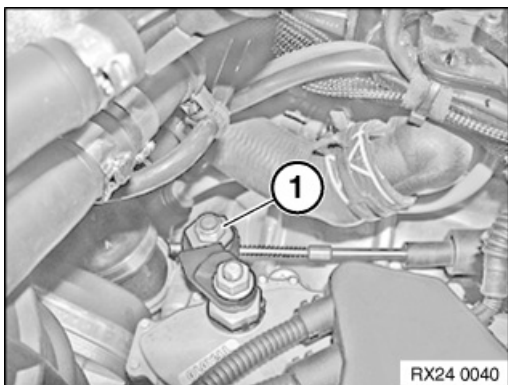
Remove wiring harness.

Pay attention to routing of wiring harness.

Note:

Similar to graphic.

Engine shown removed.



Automatic transmission only

Release cable lock nut (1).

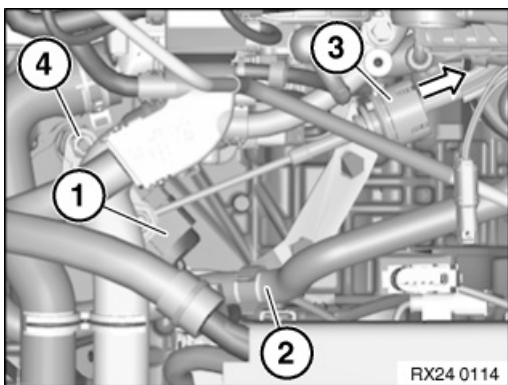
Tightening torque: 24 11 8AZ

Installation note:

Adjust selector lever.

Note:

Similar to graphic.



Automatic transmission only

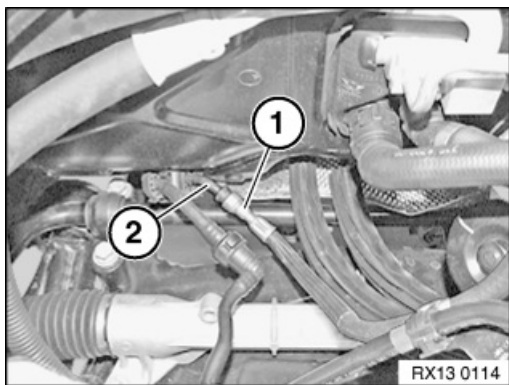
Disconnect connector (1) from selector lever position switch.

Remove hose (2) from holder.

Slide retaining sleeve (3) of the cable in direction of arrow.

Remove cable upwards from holder.



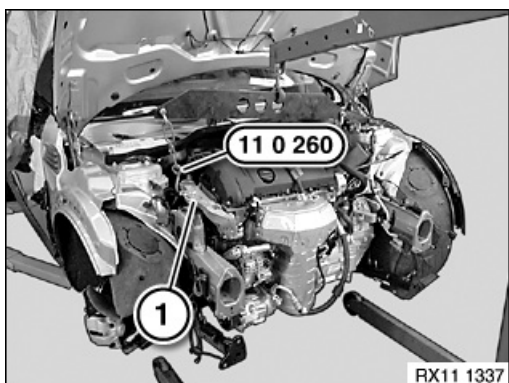


Unlock and disconnect fuel delivery line (1).
 Close off fuel line (2) with special tool 13 5 162 .
 Disconnect fuel tank vent line.

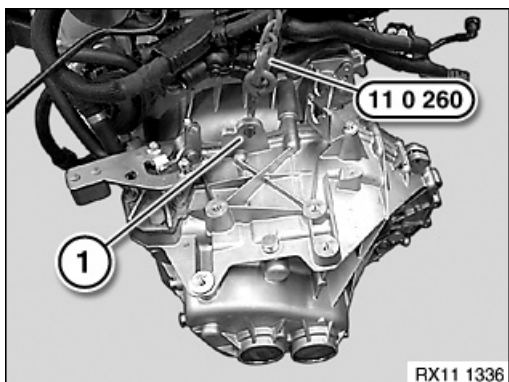
Installation note:

Retaining lugs of lock must not be damaged. A fuel line with damaged retaining lugs must be replaced.

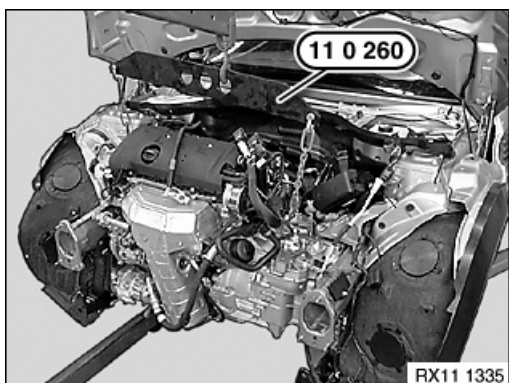
Fuel delivery line (1) must snap audibly into place.



Attach special tool 11 0 260 to lifting eye (1).



Attach special tool 11 0 260 to lifting eye (1).



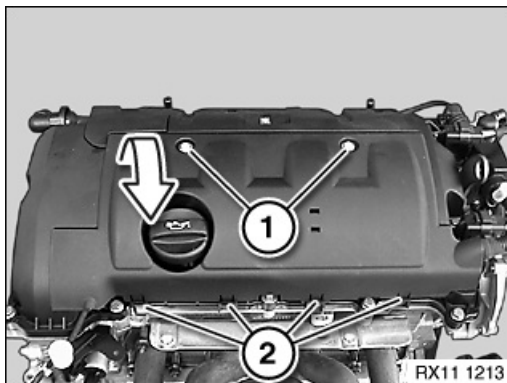
Release transmission and engine mounts.
 Remove engine with special tool 11 0 260 towards front.



Assemble engine.
 Check function of DME.



11 00 Removing and installing/replacing acoustic cover (N18)



Release screws (1).

Tightening torque: 11 12 11AZ.

Release acoustic cover at clamps (2).

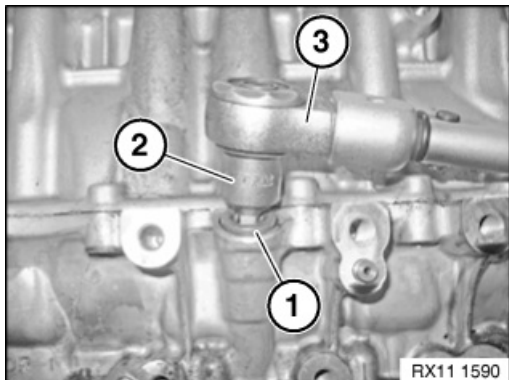
Lift off acoustic cover in direction of arrow.





Necessary preliminary tasks:

- Remove exhaust system.



Use a hexagon socket to loosen the screw plug (1) with sealing ring.

If the screw plug (1) is installed with a square drive, it must be handled with special tool (2) Hazet order number. 3702.

Tightening torque: 11 11 8AZ.



00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



Warning!

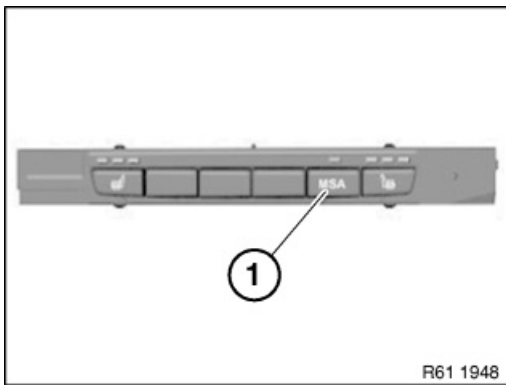
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

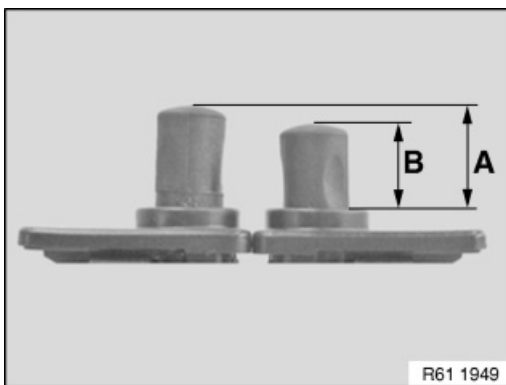
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode
A = 10 mm
 - Basic setting (engine hood/bonnet open)
B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



When working with diagnosis tools:

- Observe instructions in diagnosis tool





Note:

For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) Service Information (bulletin) 61 01 07 335
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) Service Information (bulletin) 61 01 10 629



**Warning!**

Danger of poisoning if oil is ingested/absorbed through the skin!

Risk of injury if oil comes into contact with eyes and skin!

**Recycling:**

Observe country-specific waste disposal regulations.

**Measures if oil is unintentionally released:**

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

Note: Do not flush oil away with water or aqueous cleaning agents.



**Special tools required:**

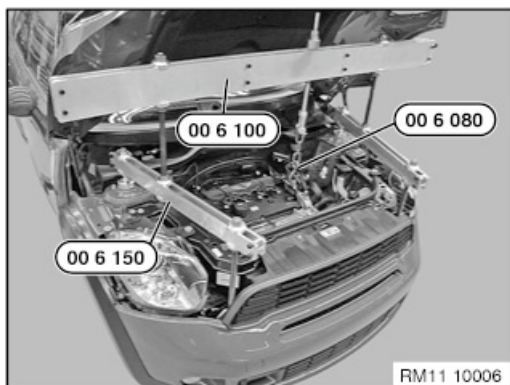
- 00 6 100
- 00 6 150
- 00 6 080

**Warning!**

Danger of injury!

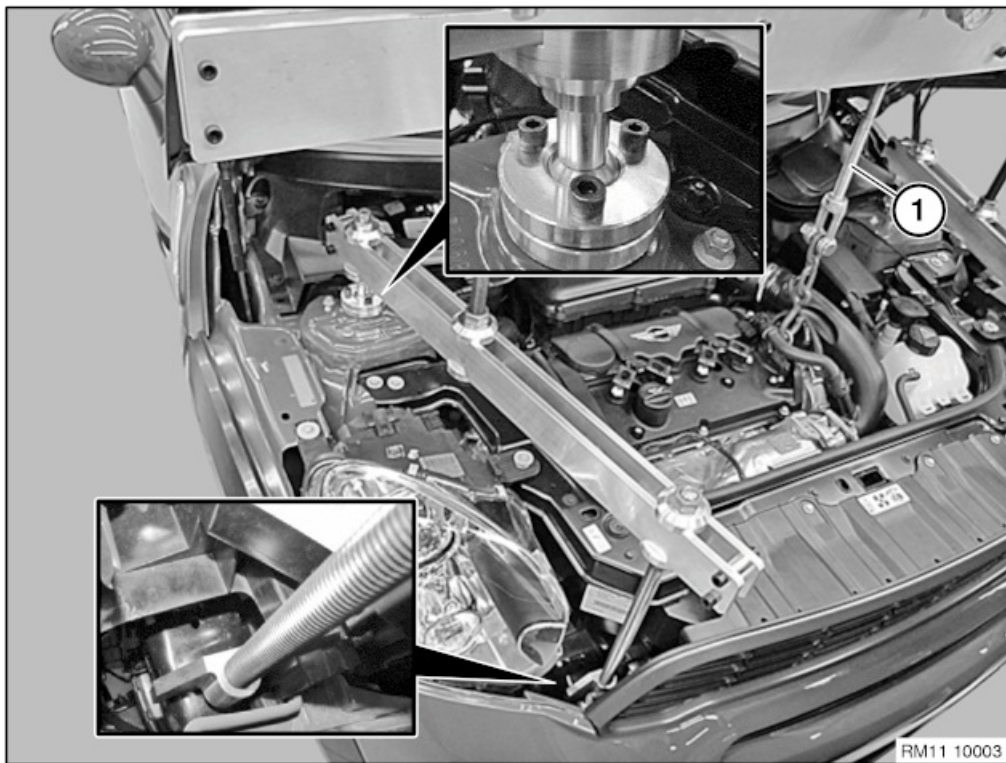
Observe following instructions relating to special tool:

1. Prior to each use, check the special tools for defects, modifications and operational reliability.
2. Damaged/modified special tools must not be used!
3. No changes or modifications may be made to the special tools!
4. Keep special tools dry, clean and free of grease.



With the aid of an assistance, place cross member 00 6 100 and supports 00 6 150 on spring strut dome and bumper support.



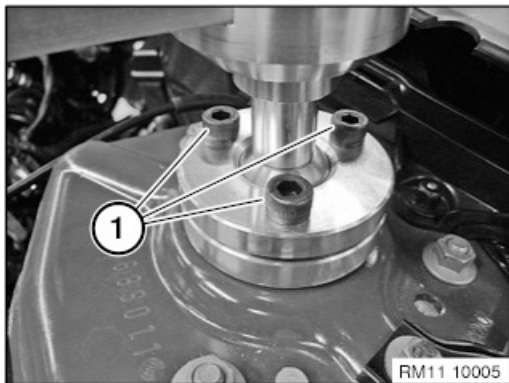


Align cross member 00 6 150 on spring strut dome and bumper support.

Slacken off Allen screws until the supports can be moved.

Align cross member 00 6 150 such that spindle (1) is correctly positioned over suspension lug.

Attach hook 00 6 080 in the suspension lug.



After aligning the special tool, tighten bolts (1).



Important!

Avoid a change of engine position in the transverse or longitudinal direction.

Always make sure there is sufficient clearance between the engine (or its add-on parts) and the body.



Important!

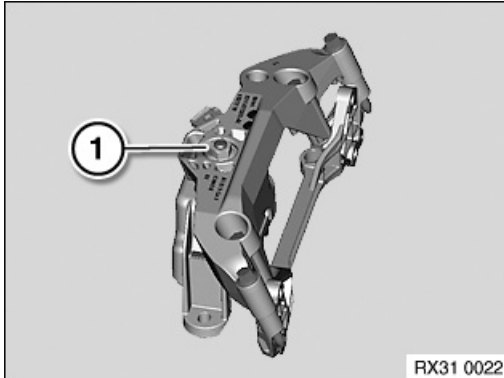
Complete the following tasks without fail before raising the engine.





Left side only:

Remove transmission support bracket



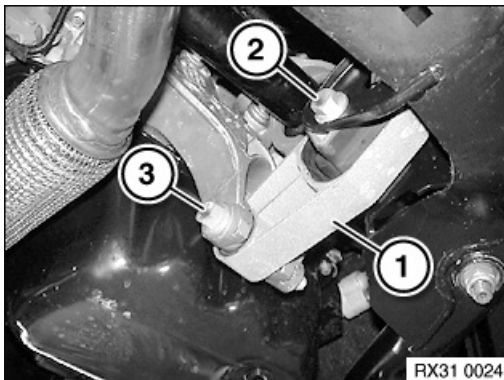
Right side only:

Slacken nut (1).

Installation note:

Replace self-locking nut.

Tightening torque 22 11 2AZ.



Picture shows R56

Important!

Avoid overelongation of rubber mounts in bracket (1) when raising.

Slacken screws (2) and (3).

Installation note:

Secure engine first to engine or transmission mounts and then tighten down bolts (2) and (3).

Tightening torque 22 11 6AZ.



**Special tools required:**

- 00 6 100
- 00 6 150
- 00 6 080
- 11 6 210
- 11 9 583
- 11 9 581

**Warning!**

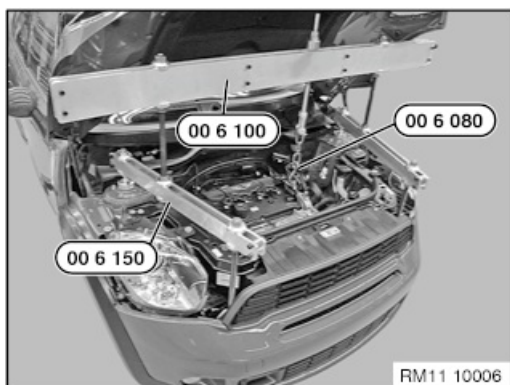
Danger of injury!

Observe following instructions relating to special tool:

1. Prior to each use, check the special tools for defects, modifications and operational reliability.
2. Damaged/modified special tools must not be used!
3. No changes or modifications may be made to the special tools!
4. Keep special tools dry, clean and free of grease.

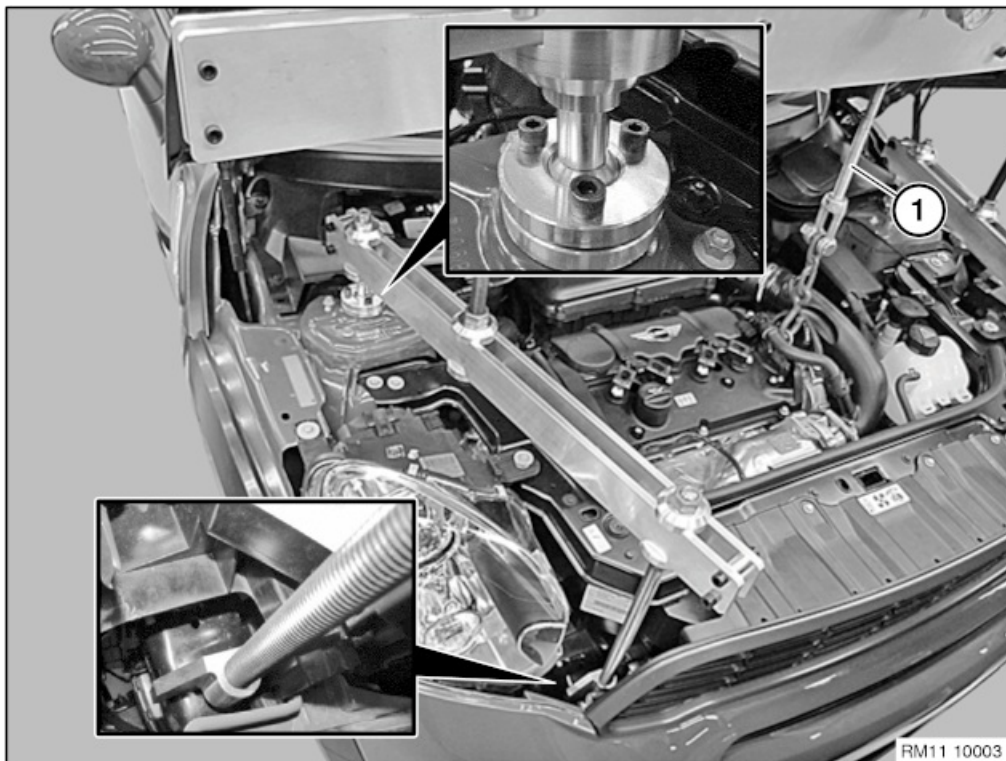
**Necessary preliminary work:**

- Remove right wheel arch cover



With the aid of an assistance, place cross member 00 6 100 and supports 00 6 150 on spring strut dome and bumper support.



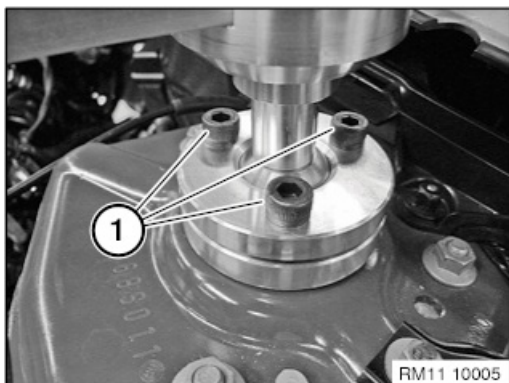


Align cross member 00 6 150 on spring strut dome and bumper support.

Slacken hexagon socket screw until the rests can be moved.

Align cross member 00 6 150 such that spindle (1) is correctly positioned over suspension lug.

Attach hook 00 6 080 in the suspension lug.



After aligning the special tool, tighten bolts (1).



Attention!

Avoid a change of engine position in the transverse or longitudinal direction!

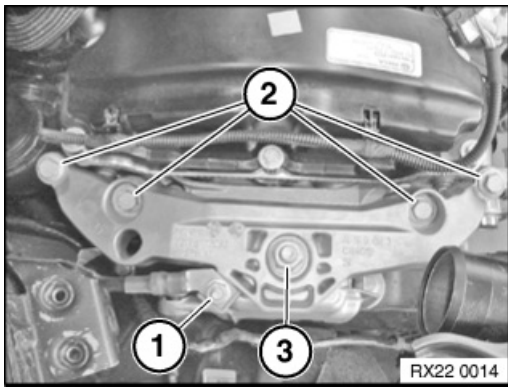
Always make sure there is sufficient clearance between the engine (or its add-on parts) and the body.



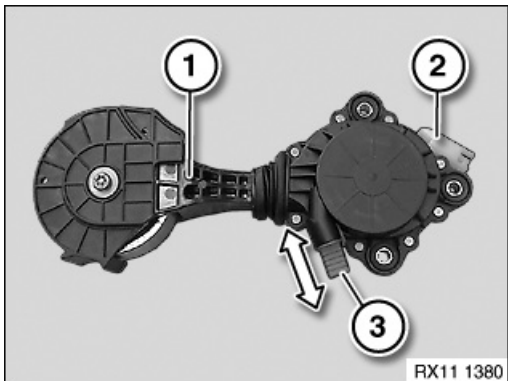
Attention!

Complete the following tasks without fail before raising the engine.

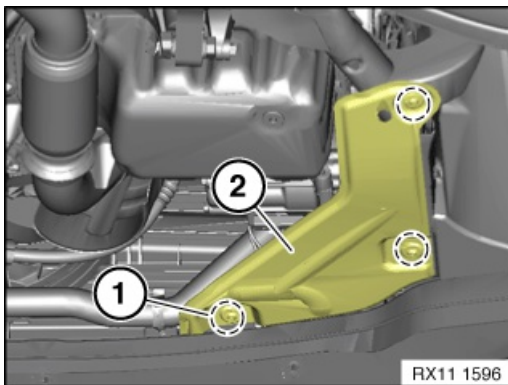




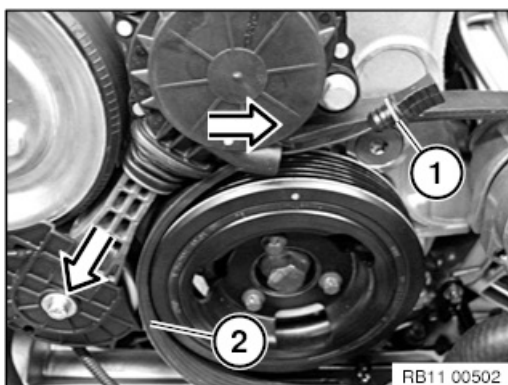
Release nut (1) and remove ground strap.
 Unfasten screws (2).
 Unscrew nut (3).
 Remove engine mounting bracket.



Pull out friction wheel with mechanical unlocking (3) in direction of arrow and lock on locking hook.
 Friction wheel (1) lifts mechanically from belt drive.
 Plug connection (2) on friction wheel.
Note:
 Graphic shows friction wheel removed.



Release screws (1).
 Remove (2) belt pulley cover.



Move friction wheel into service position.

In order to release the power transmission between belt pulley and coolant pump, it is necessary to move the friction wheel into the service position.

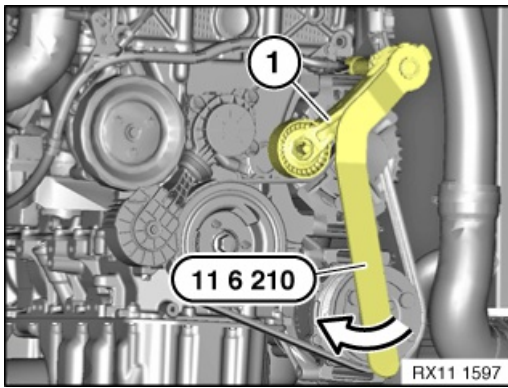
Pull service strap (1) in direction of arrow until friction wheel is separated from belt pulley.

Drive belt (2) can now be removed.

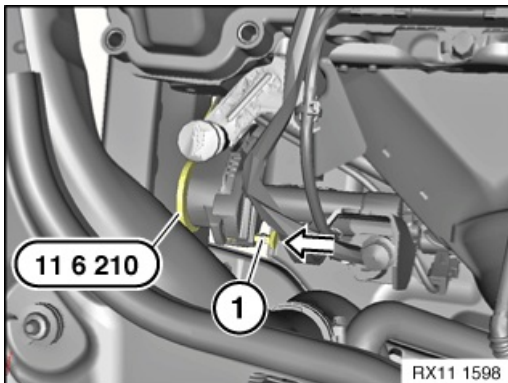
Installation note:

Service strap (1) must be exactly inserted and locked before start-up.





Bring belt tensioner (1) into assembly position in direction of arrow using special tool 11 6 210 .*Note:*
Figure and description on the removed engine for better illustration.



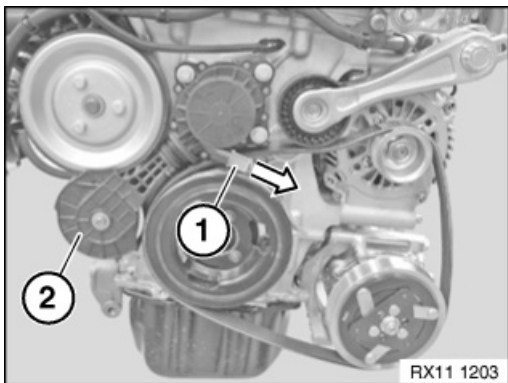
Secure working position of belt tensioner by sliding locating pin (1) in direction of arrow.

In so doing, grasp the belt tensioner through the opening in the wheel arch.

Warning!

Danger of injury!

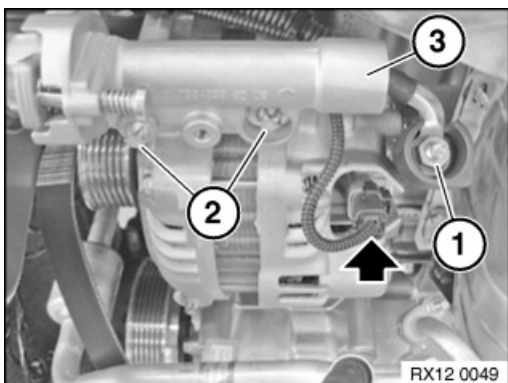
Remove special tool 11 6 210 again from belt tensioner.



Move friction wheel (2) into service position.

In order to release the power transmission between crankshaft and coolant pump, it is necessary to move the friction gear (2) into the service position.

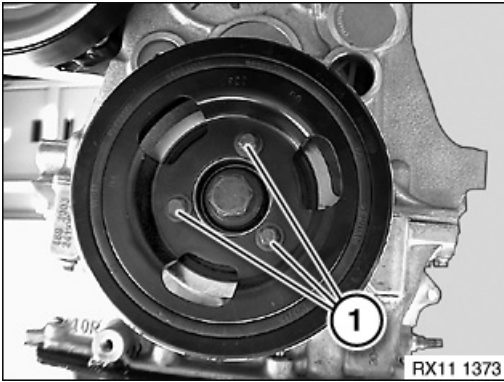
Pull handle (1) in direction of arrow until friction gear (2) is separated from belt pulley.



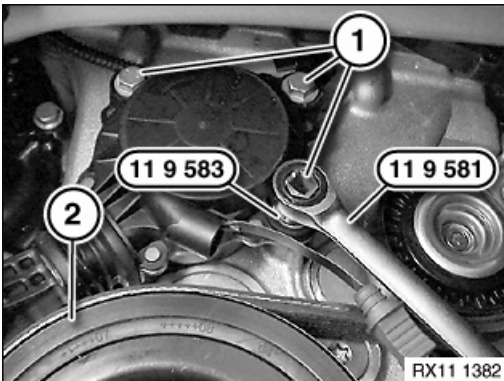
Unfasten screws (2).

Release tensioning device (3) with the screws by around 5 cm.

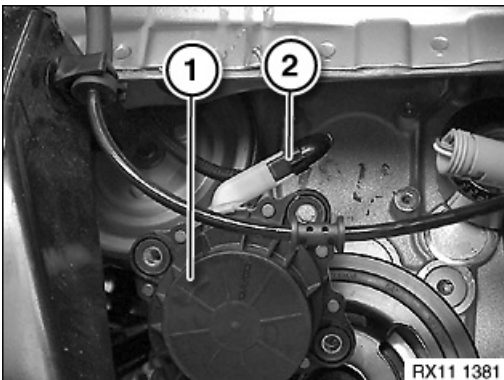




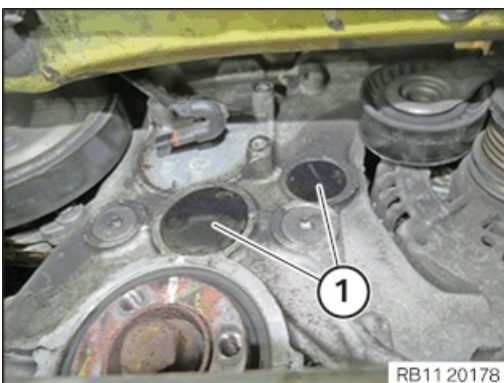
Release screws (1).
Remove vibration damper.



Undo bolts (1) with special tool 11 9 583 and 11 9 581 .
Remove friction wheel (2) downwards.

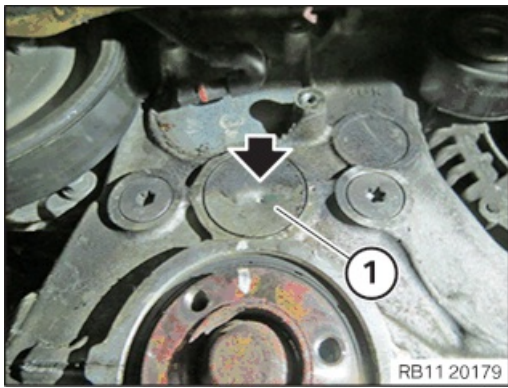


Remove friction wheel (1) towards bottom.
Disconnect plug connection (2).

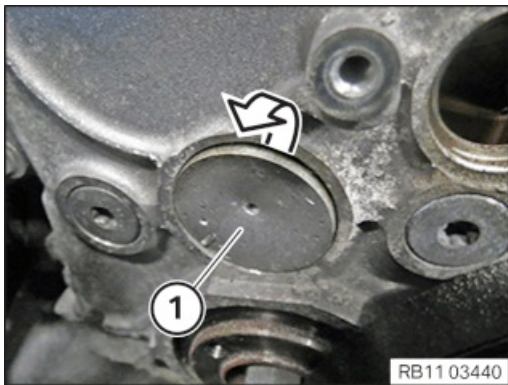


Sealing cap (1) are made of aluminium. *Installation note:*
Aluminium sealing caps (1) must be bonded when installed.

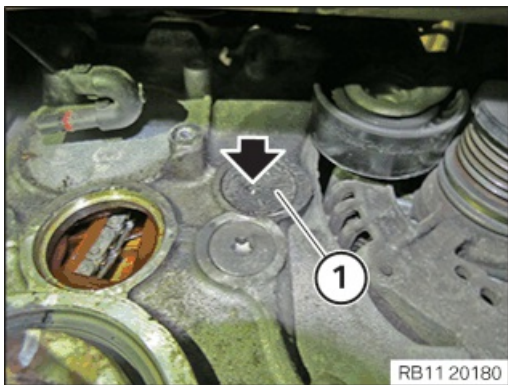




Forcefully drive out sealing cap (1) in the middle with a centre punch using a 500 g hammer.



Sealing cap (1) can now be removed in direction of arrow.

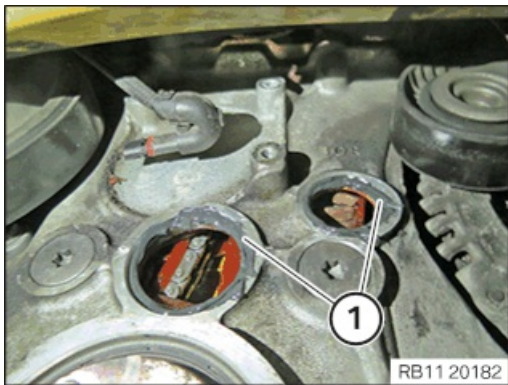


Forcefully drive out sealing cap (1) in the middle with a centre punch using a 500 g hammer.



Clean sealing surfaces with a BMW brake cleaner.





Apply a thin, even layer of sealing compound 2.2 to the sealing surfaces (1).



Different sizes (2) are required to drive in the sealing cap (1).



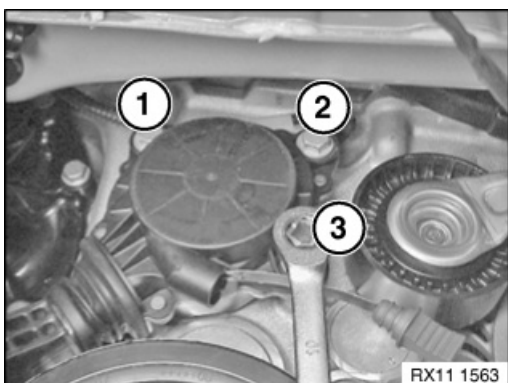
Drive in the sealing cap with a matching adapter (1) up to limit position using a hammer (2).

Graphic N13.



Assemble engine. *Installation note:*

Check cable routing for correct installation position (**risk of damage!**).

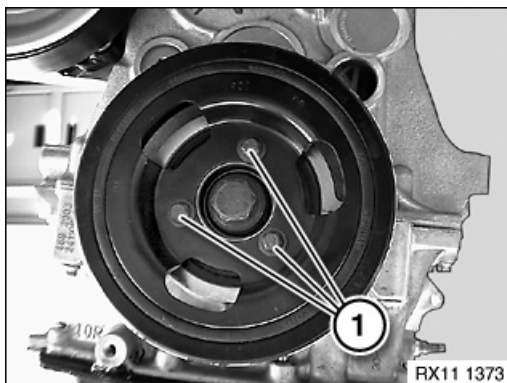


Installation note:

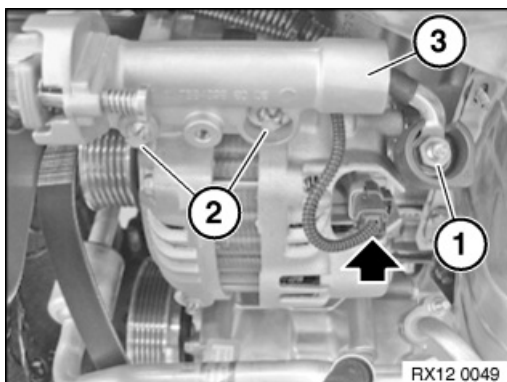
Follow the sequence 1 to 3 for the screw connection of the friction wheel.

Tightening torque: 9 Nm.

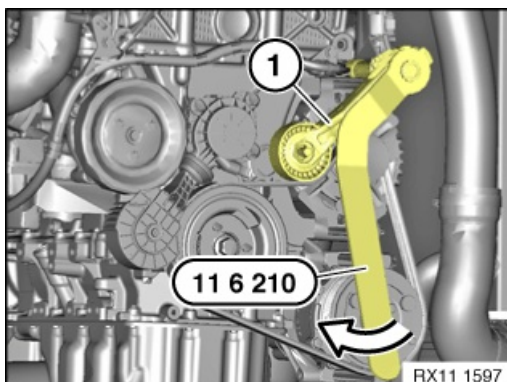




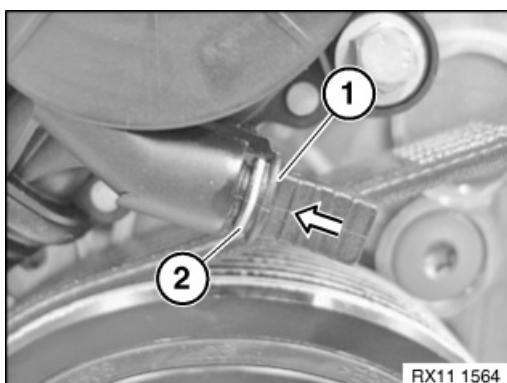
Attach vibration damper.
Secure screws (1).
Tightening torque: 11 23 1AZ.



Position tensioning device (3).
Secure screws (2).
Tightening torque: 11 28 1AZ.

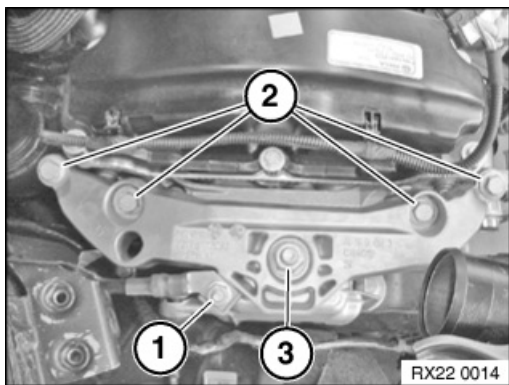


Position drive belt .
Pretension belt tensioner (1) in direction of arrow.
Remove belt tensioner (1) with special tool 11 6 210 .



Installation note:
Slowly retract tensioning strap (1) in direction of arrow.
Plastic ring (2) must engage in friction gear housing.





Position the engine mounting bracket.

Tightening torque 22 11 7AZ.

Unfasten screws (2).

Tightening torque 22 11 2AZ.

Unscrew nut (3).

Tightening torque 22 11 1AZ.



Necessary preliminary work:

- Install right wheel arch cover.

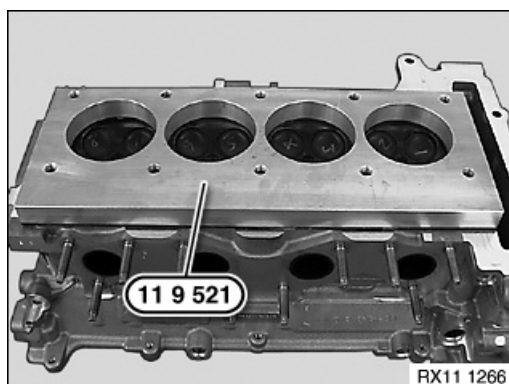


**Special tools required:**

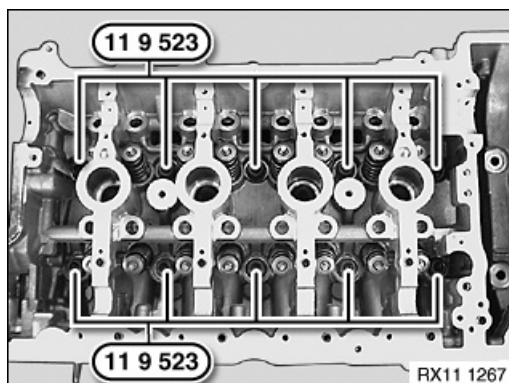
- 11 9 521
- 11 9 522
- 11 9 523

**Necessary preliminary tasks:**

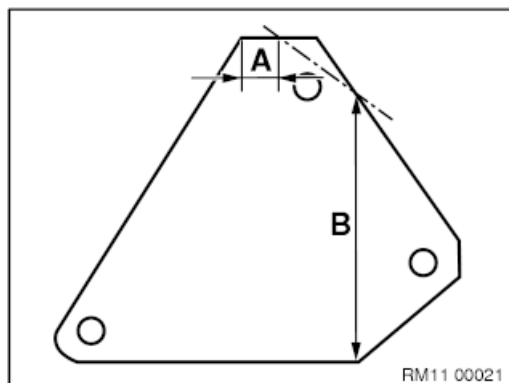
- Remove cylinder head.
- Disassemble cylinder head.



Extend special tool 11 9 521 with special tool 11 9 523. *Installation note:* Assemble special tool 11 9 521 so that all water channels are sealed.



Fix special tool 11 9 523 by tightening to **25 Nm**.

**Important!**

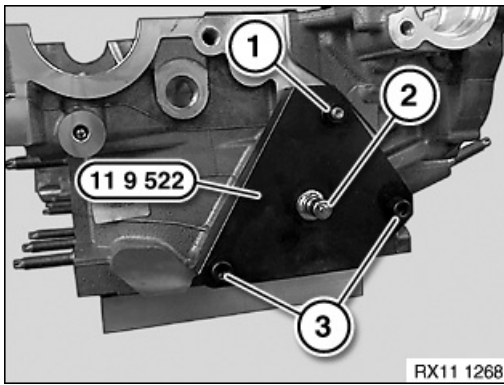
For the N18 engine, the special tool 11 9 522 must be modified.

Dimension (A) 15 mm, dimension (B) 79.85 mm.

Both dimensions have to be transferred to special tool 11 9 522.

Using a suitable tool, cut off the top corner along the dotted line.





Screw special tool 11 9 522 into place with existing screws (1 and 3) of coolant thermostat.

Sealing flange must rest flat.

Note:

Compressed air on valve (2) maximum **3 bar**.

Heat cylinder head to 60 °.

Visual inspection in a water bath.

Picture shows (N12).



Assemble engine.



11 12 270 pump (N13)

Removing and installing/replacing drive unit for high pressure



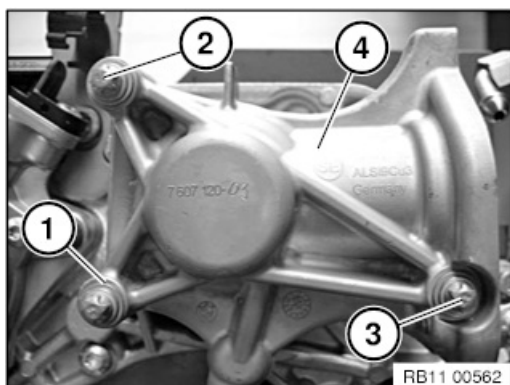
Caution!

It is possible to fit the drive unit incorrectly.



Necessary preliminary work:

- Remove high pressure pump.



Version before 2013

Note:

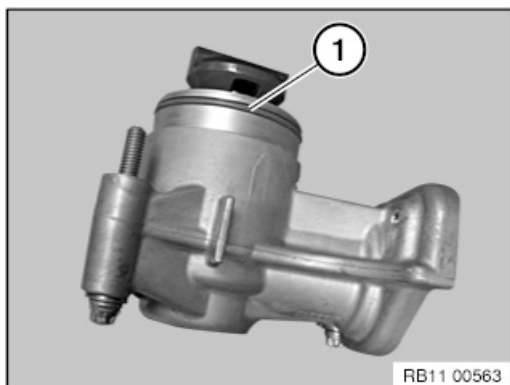
Screw (3) cannot be unscrewed when installed.

Screw (3) must be removed with the drive unit.

Release screws (1 to 3).

Remove drive unit (4).

Tightening torque: 11 12 11AZ.

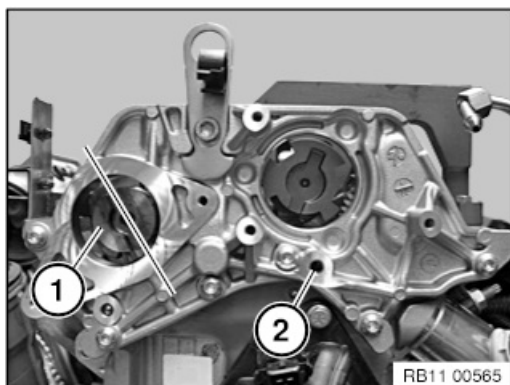


Installation note:

Insert bolts into drive unit before mounting on cylinder head.

Replace O-ring (1).

Replace O-ring to lubricate the drive unit.



Caution!

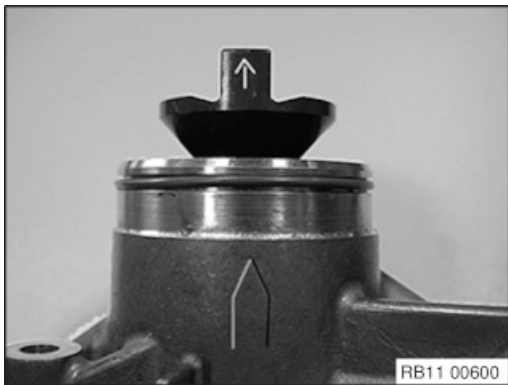
O-ring (2) of the drive unit may stick to the cylinder head.

Take note of the position of the inlet camshaft.

Crank engine to the installation position by turning the central bolt (see graphic).

The recess on the inlet camshaft for the cam lobe must be closed at the top (see graphic).

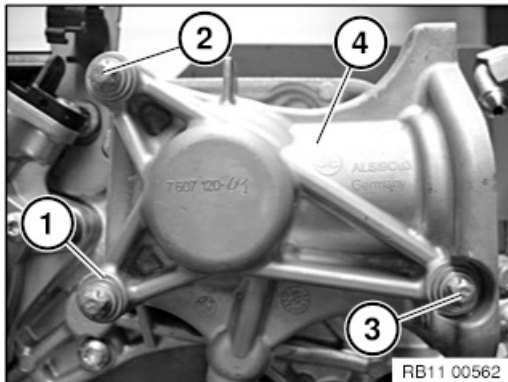




Installation note:

Insert bolts into drive unit before mounting on cylinder head.

There are arrows on the drive flange and the drive unit which must be positioned in line with each other (see graphic).



Version after 2013

Note:

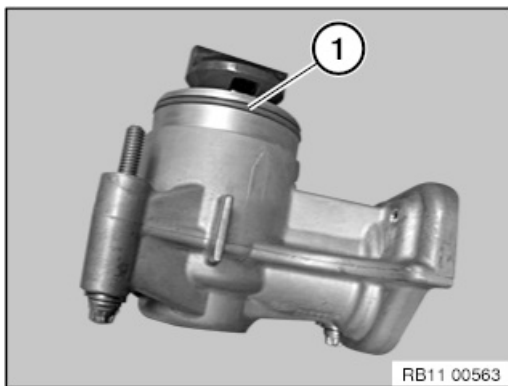
Screw (3) cannot be unscrewed when installed.

Screw (3) must be removed with the drive unit.

Release screws (1 to 3).

Remove drive unit (4).

Tightening torque: 11 12 11AZ.

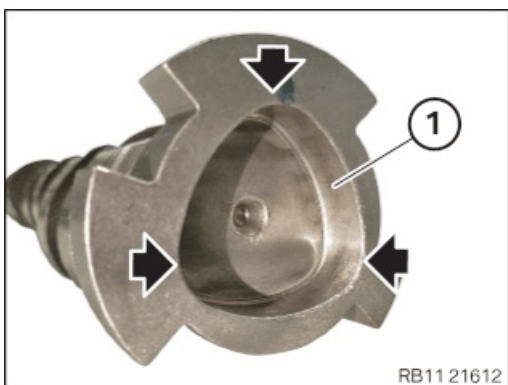


Installation note:

Insert bolts into drive unit before mounting on cylinder head.

Replace O-ring (1).

Replace O-ring to lubricate the drive unit.

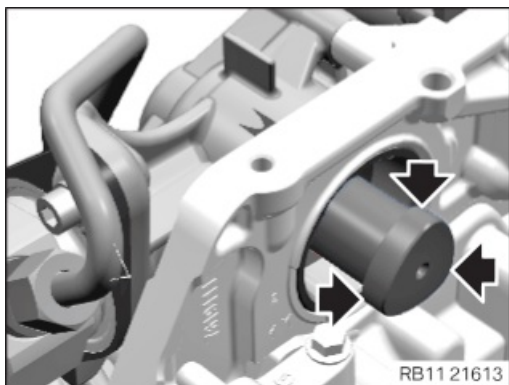


Caution!

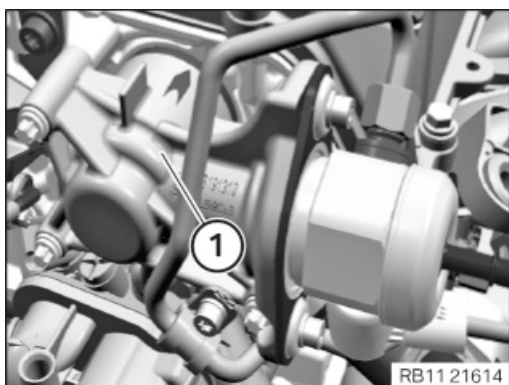
O-ring of the drive unit may stick to the cylinder head.

Take note of the position of the inlet camshaft.





Installation note:
 The position of the cam on the drive unit can be freely selected.
 Join the cam by turning the drive unit slightly.



Position the drive unit (1).



Assemble engine.



**Special tools required:**

- 11 2 250
- 11 4 471
- 11 4 472
- 11 9 590
- 11 9 630

**Important!**

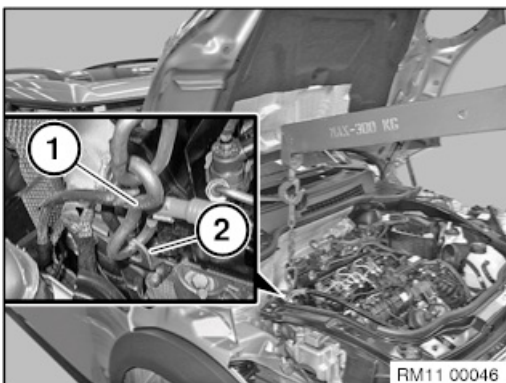
Fit new cylinder head bolts.

Do not wash off bolt coating.

There must not be any coolant, water or oil present in the pocket holes (**risk of corrosion and cracking**).

**Necessary preliminary tasks:**

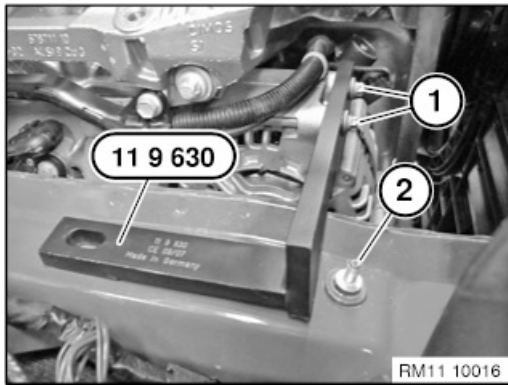
- Remove exhaust turbocharger.
- Drain coolant.
- Drain engine oil.
- Remove intake plenum.
- Detach all coolant hoses from engine.
- Remove oil dipstick guide tube.
- Remove cylinder head cover.
- Remove solenoid valve.
- Remove intake and exhaust camshaft adjuster.



Attach engine crane (1) to engine mounting bracket (2).

Slightly raise the engine with the engine crane.





Note:

Move front panel into working position.

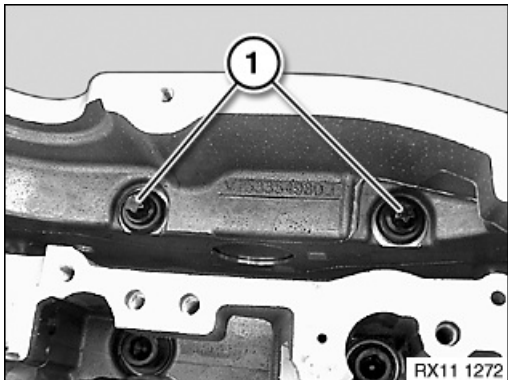
Release upper alternator screws (1). Do not remove alternator.

Remove right engine mount.

Secure special tool 11 9 630 with standard bolts (1).

Lower the engine crane and ensure that the ground support point (2) is not damaged.

Place the special tool 11 9 630 onto the side member.



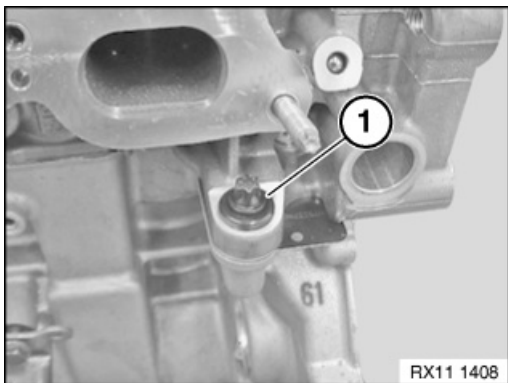
Release screws (1). **Important!**

If the timing chain is stowed in the gear case, the crankshaft must no longer be rotated.

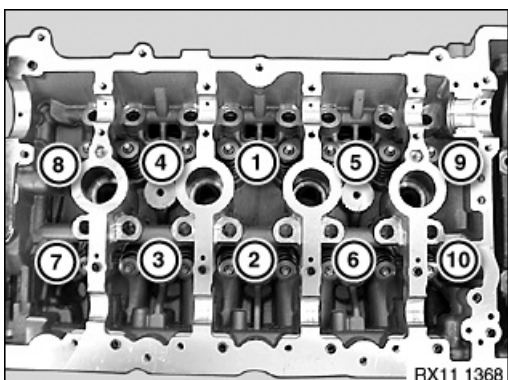
The timing chain may jam on the crankshaft gear.

Installation note:

The timing chain is only lifted out using a hook during assembly.



Release screw (1).



Release cylinder head bolts with special tool 11 2 250 .

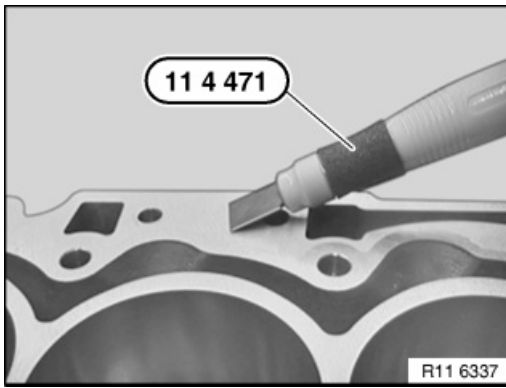
Release cylinder head bolts from outside inwards (10 to 1).

Note:

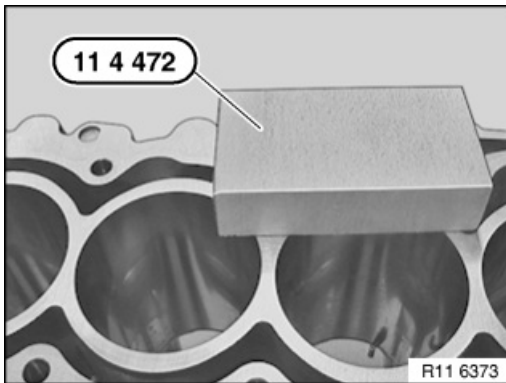
Remove washers with a magnet.

Graphic without camshafts.





Use special tool 11 4 471 to remove coarse gasket remnants from sealing surfaces on cylinder head and on crankcase.

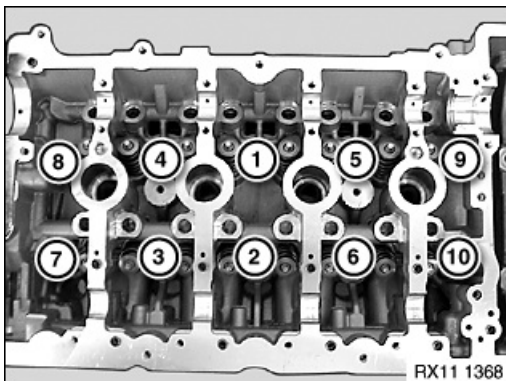


Remove fine gasket remnants with special tool 11 4 472 .

There must not be any coolant, water or oil present in the pocket holes **(risk of corrosion and cracking)**.

Clean all blind holes with suitable tools.

Replace cylinder head gasket.



Important!

Fit new cylinder head bolts.

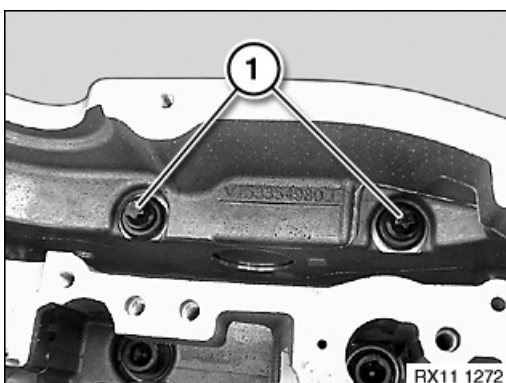
Do not wash off bolt coating.

Attach washers to cylinder head bolts.

Washers can drop into the engine **(risk of damage!)**.

Secure cylinder head bolts from inside outwards (1 to 10).

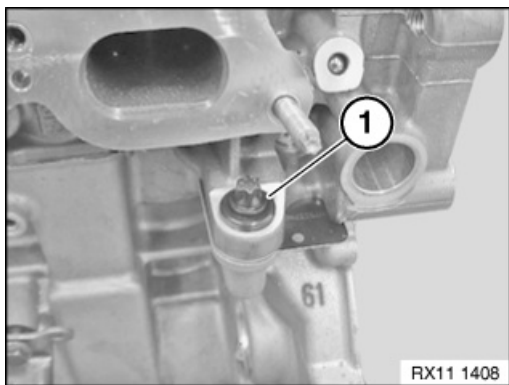
Tightening torque: 11 12 2AZ.



Secure screws (1).

Tightening torque: 11 12 1AZ.





Tighten bolt (1).

Tightening torque: 11 12 3AZ.



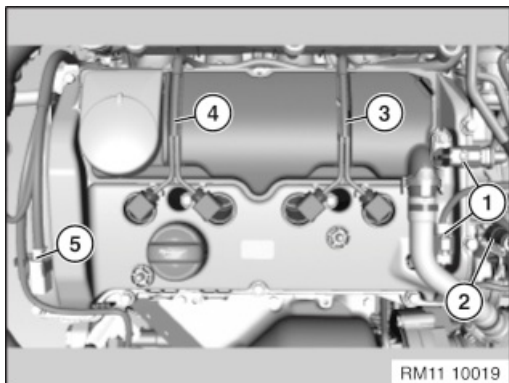
Assemble engine.





Necessary preliminary tasks:

- Unclip ignition wiring harness on cylinder head.
- Remove rod-type ignition coils.
- Remove intake silencer housing.

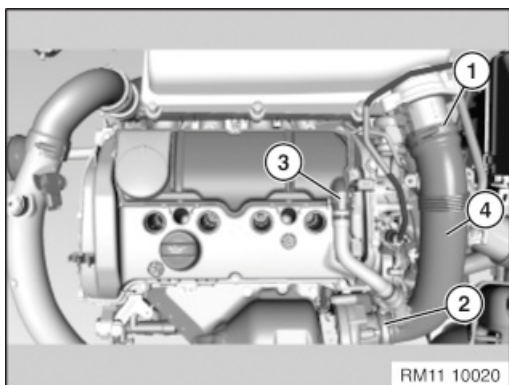


Release connector (1) and remove.

Unlock and detach vacuum line (2).

Lay ignition leads (3 and 4) to one side.

Unclip the cable from the holder (5).



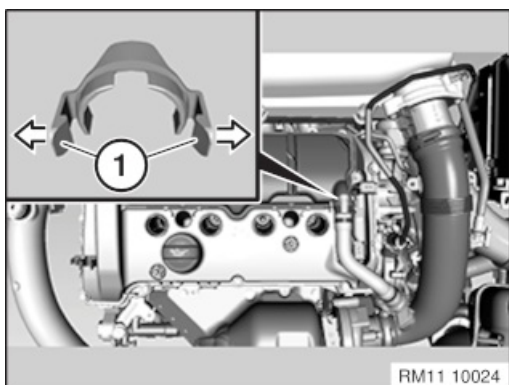
Release clamps (1 and 2). **Important!**

Lock (3) of ventilation line must not be released.

Cylinder head cover is removed with ventilation line and air duct (4).

Installation note:

Install air duct (4) dry and free from grease.



Important!

When replacing the cylinder head cover,

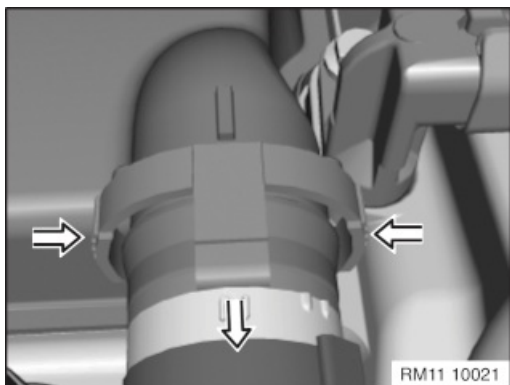
convert the ventilation line.

To do so, break off tabs of retaining clip (1) in direction of arrow outwards.

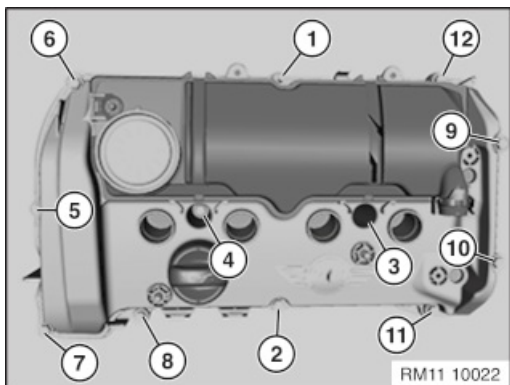
Installation note:

A new retaining clip must be fitted.

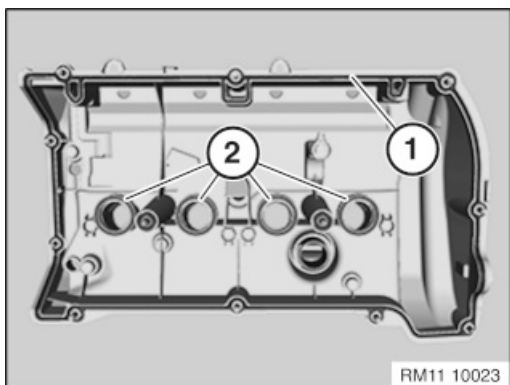




Press locks together and detach ventilation line.

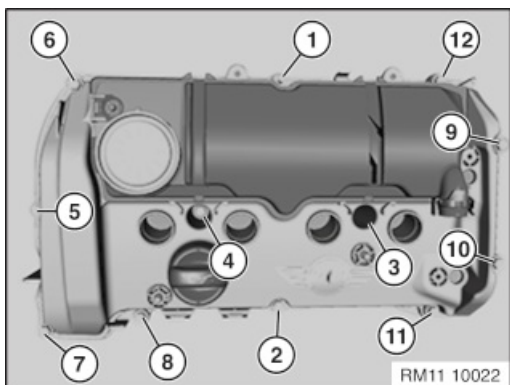


Detach ground cable at screw connection (1).
Release cylinder head cover bolts in the sequence 12 to 1.



Replace gasket (1).
Replace all gaskets (2).
Installation note:
Clean all sealing surfaces.

Installation note:
Seal all edges and contact points on the cylinder head with Drei Bond 1209sealing compound.



Secure bolts for cylinder head cover in the sequence 1 to 12.
Tightening torque: 11 12 4AZ.



Assemble engine.

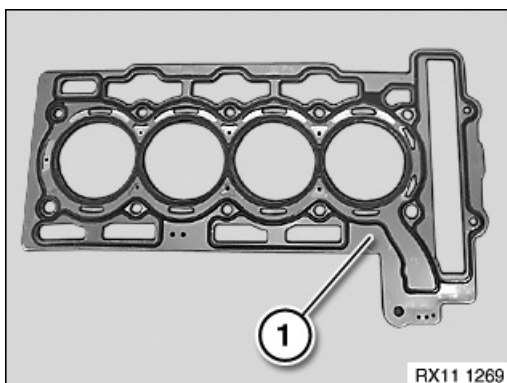


**Special tools required:**

- 11 4 470

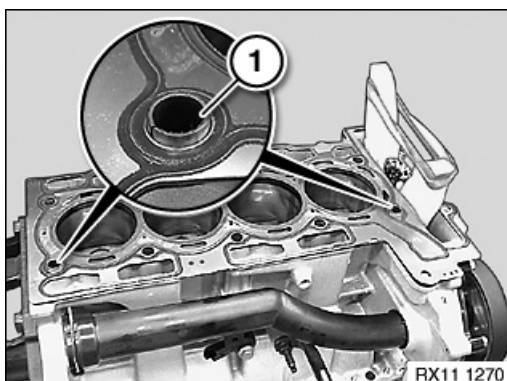
*Necessary preliminary tasks:*

- Remove cylinder head.

**Identification (1) of head gasket (N18). Important!**

Rubber coating on cylinder head gasket must not be damaged under any circumstances.

If the cylinder head is re-machined, a thicker coating + 0.3 mm is also available for service personnel.



Check adapter sleeves (1) for damage and firm seating.

Lay cylinder head gasket on engine block.

*Note:*

Check cylinder head for deviation from flatness.

Check cylinder head for watertightness.

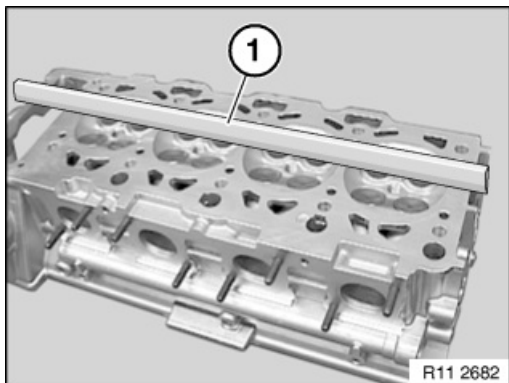
Assemble engine.





Necessary preliminary tasks:

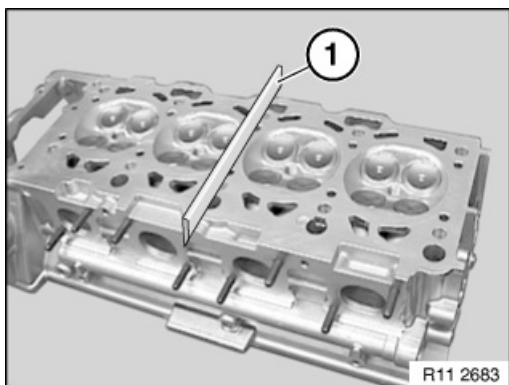
- Remove cylinder head.
- Remove exhaust camshaft.
- Remove intake camshaft.



Check evenness of cylinder head lower face with a standard straightedge (1). *Note:*

Max. deviation from flatness (longitudinal) 0.10 mm

Illustration shows N43.



Check evenness of cylinder head lower face with a standard straightedge (1). *Note:*

Max. deviation from flatness (transverse) 0.05 mm

Graphic shows N43.



Check cylinder head for watertightness.

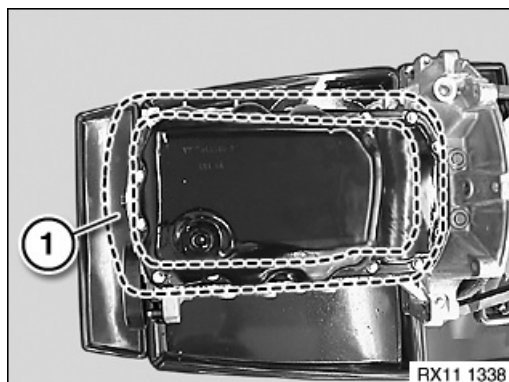


**Special tools required:**

- 11 4 470
- 11 9 581
- 11 9 582

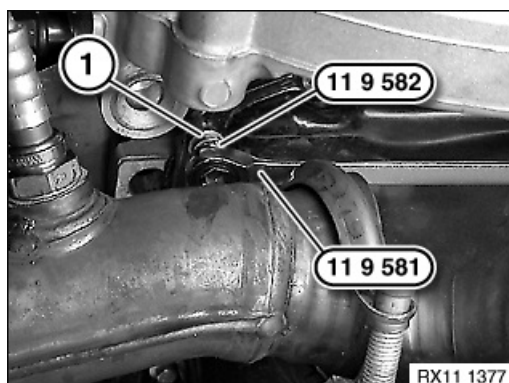
**Necessary preliminary tasks:**

- Drain engine oil.
- Remove transfer box (AWD only).
- Protect exhaust system against oil contamination and cover with suitable materials, clean if required.

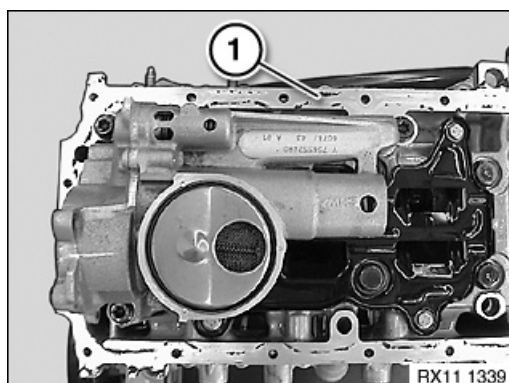


Unscrew sump bolts in area of line (1).

Tightening torque: 11 13 2 AZ.

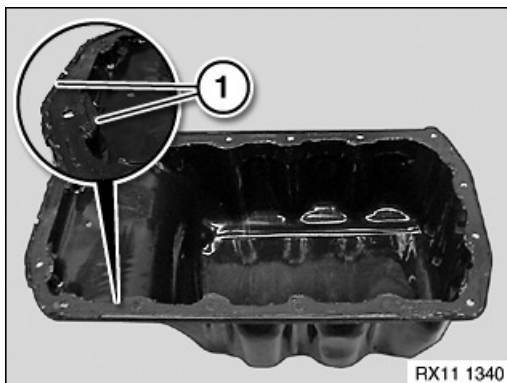


Remove bolt (1) above exhaust manifold using special tools 11 9 582 and 11 9 581 .



Clean sealing surface (1) with special tool 11 4 470 .





Important!

Do not remove sealing bead itself. Use a sharp knife to remove only the protruding or sticking-out parts of sealing beads (1).

Installation note:

Use liquid gasket 2.2.

Apply liquid gasket thinly and evenly.



Assemble engine.





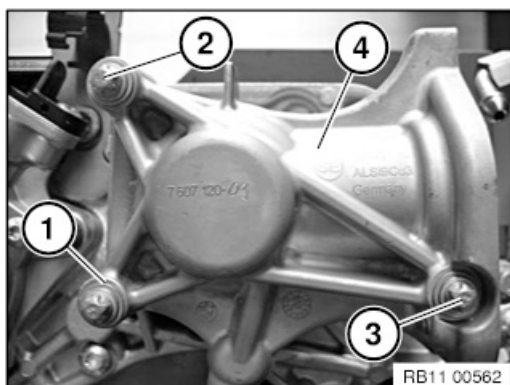
Caution!

It is possible to fit the drive unit incorrectly.



Necessary preliminary work:

- Remove high pressure pump.



Version before 2013

Note:

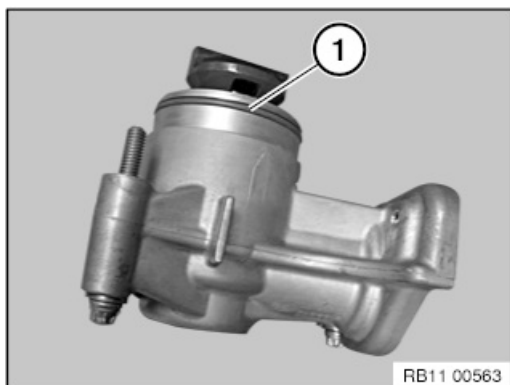
Screw (3) cannot be unscrewed when installed.

Screw (3) must be removed with the drive unit.

Release screws (1 to 3).

Remove drive unit (4).

Tightening torque: 11 12 11AZ.

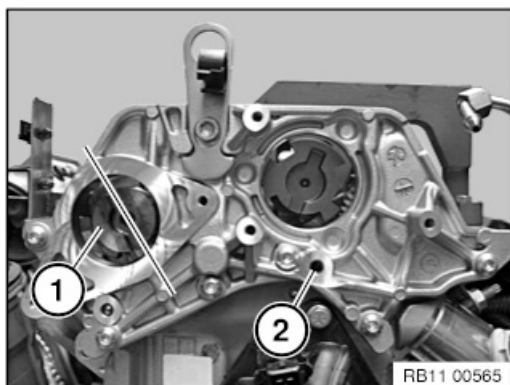


Installation note:

Insert bolts into drive unit before mounting on cylinder head.

Replace O-ring (1).

Replace O-ring to lubricate the drive unit.



Caution!

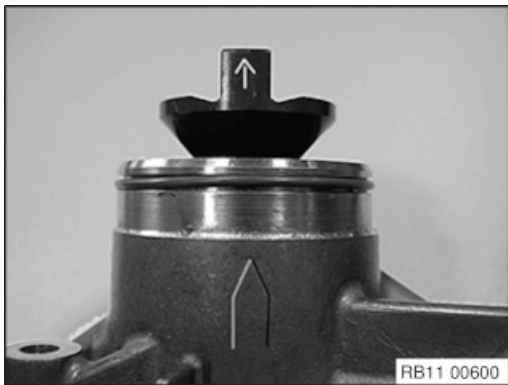
O-ring (2) of the drive unit may stick to the cylinder head.

Take note of the position of the inlet camshaft.

Crank engine to the installation position by turning the central bolt (see graphic).

The recess on the inlet camshaft for the cam lobe must be closed at the top (see graphic).

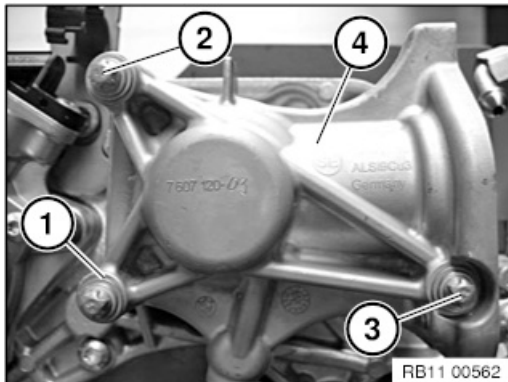




Installation note:

Insert bolts into drive unit before mounting on cylinder head.

There are arrows on the drive flange and the drive unit which must be positioned in line with each other (see graphic).



Version after 2013

Note:

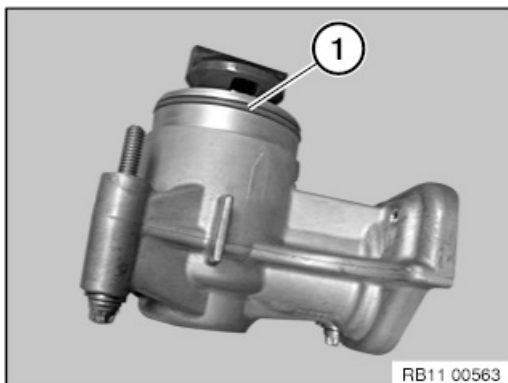
Screw (3) cannot be unscrewed when installed.

Screw (3) must be removed with the drive unit.

Release screws (1 to 3).

Remove drive unit (4).

Tightening torque: 11 12 11AZ.

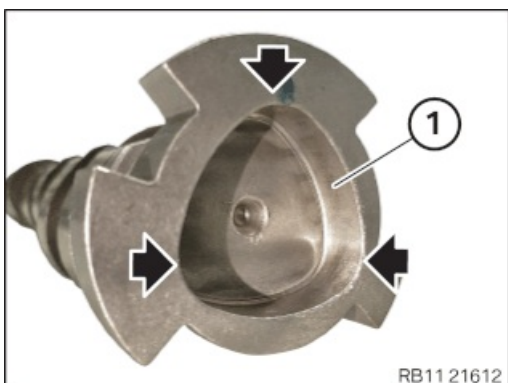


Installation note:

Insert bolts into drive unit before mounting on cylinder head.

Replace O-ring (1).

Replace O-ring to lubricate the drive unit.

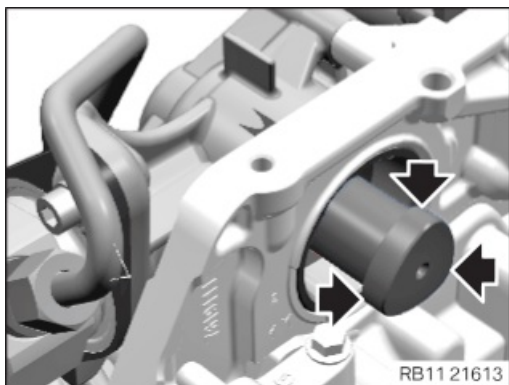


Caution!

O-ring of the drive unit may stick to the cylinder head.

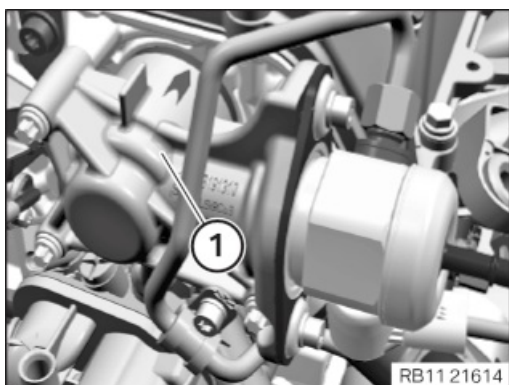
Take note of the position of the inlet camshaft.





Installation note:

The position of the cam on the drive unit can be freely selected.
Join the cam by turning the drive unit slightly.



Position the drive unit (1).



Assemble engine.

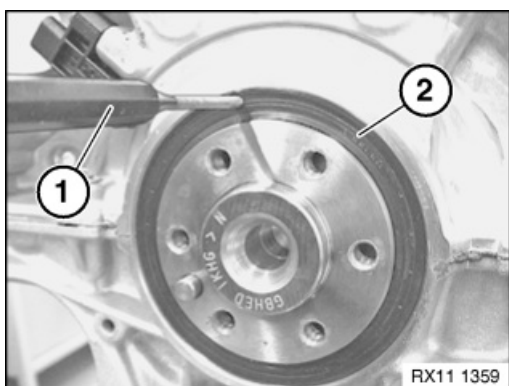


**Special tools required:**

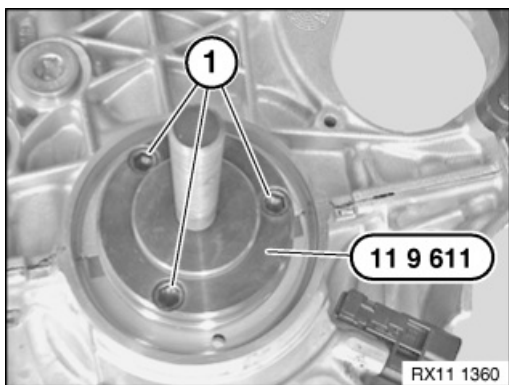
- 11 9 611
- 11 9 612
- 11 9 613

**Necessary preliminary tasks:**

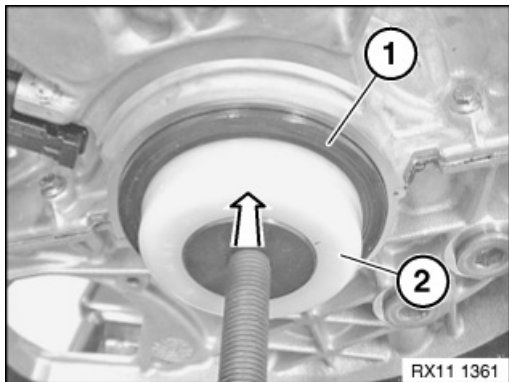
- Remove transmission.
- Remove flywheel.



Brake off PTFE ring (2) with a punch (1). **Important!**
Risk of damage! to crankcase and to crankshaft!



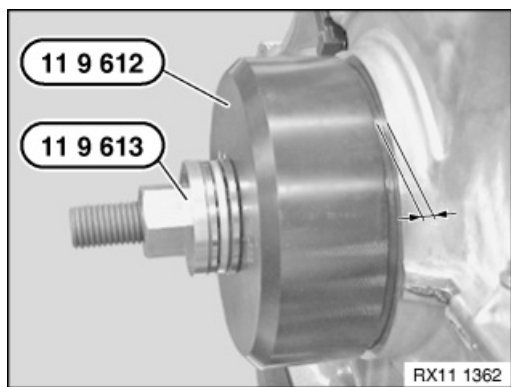
Use the supplied screws (1) to install the special tool 11 9 611 on the crankshaft.



Position the PTFE ring (1) with the support ring (2) on the special tool 11 9 611 .

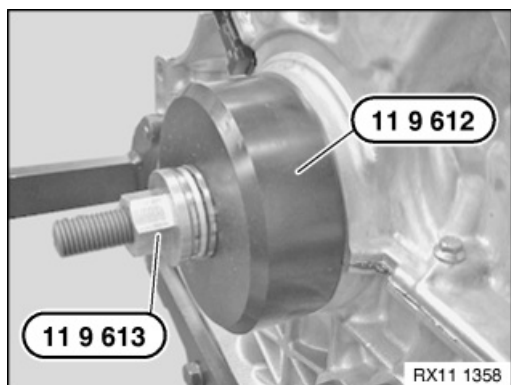
Push PTFE ring (1) in direction of arrow over support ring (2) onto crankshaft.





Connect the special tool 11 9 612 .

Use the special tool 11 9 613 to draw the PTFE ring in.



Screw the special tool 11 9 612 in up to the engine block.



Assemble engine .



11 14 005 Replacing front crankshaft seal (N18)



Special tools required:

- 11 9 601
- 11 9 602
- 11 9 603



Important!

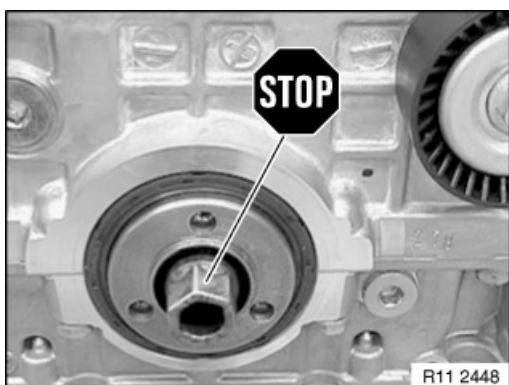
PTFE ring is supplied with a support disc.

Support disc is required as a mounting tool; do not touch the inner surface of PTFE ring with fingers (**risk of damage!**).



Necessary preliminary work:

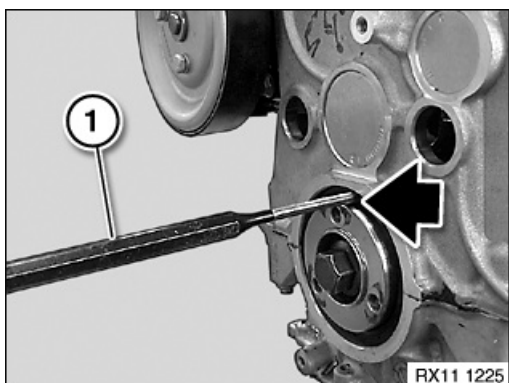
- Remove the A/C line from the air conditioning compressor.
- Remove vibration damper.



Important!

Do not release central bolt.

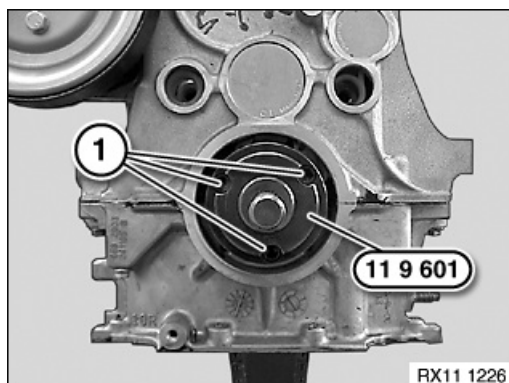
If the central bolt is released, the sprockets of the timing chain and the oil pump will no longer be non-positively connected to the crankshaft. The camshafts can twist in relation to the crankshaft (**risk of damage!**).



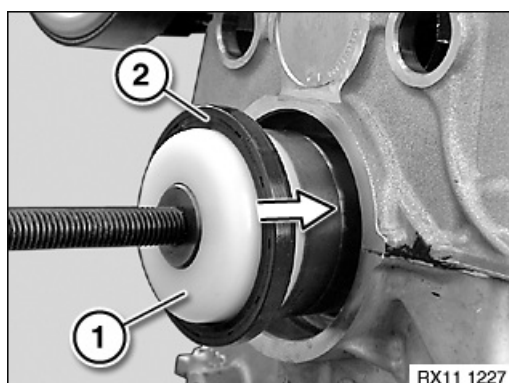
Drive PTFE ring inwards with a punch (1) until PTFE ring tilts outwards at bottom. **Important!**

PTFE ring can slip inwards.





Use screws (1) to secure the special tool 11 9 601 on the crankshaft to 15 Nm.

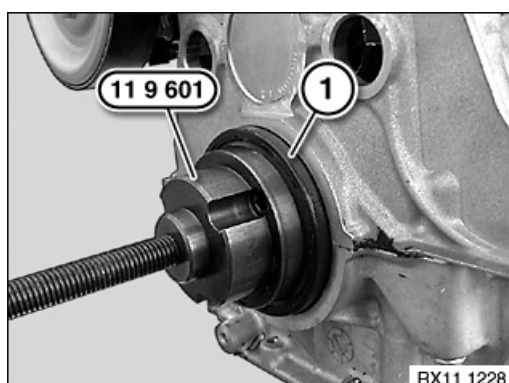


Installation note:

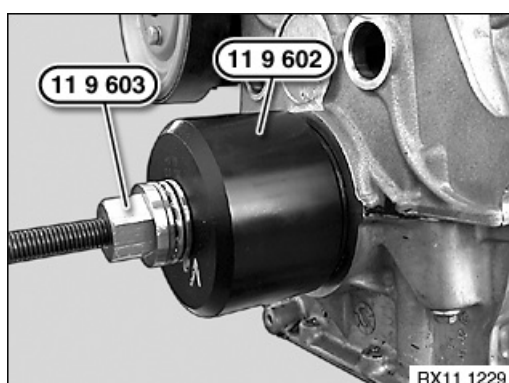
Lightly oil the special tool 11 9 601 .

Position the PTFE ring (2) with the support disc (1) on special tool 11 9 601 .

Push PTFE ring (2) over support disc (1) in direction of arrow up to crankcase.



Remove support disc from the special tool 11 9 601 .*Note:*
Support disc is no longer needed.



Use the special tool 11 9 602 together with special tool 11 9 603 to draw the PTFE ring in flush.



Assemble engine.



**Special tools required:**

- 11 4 470

**Important!**

Modified assignment of bearing positions.

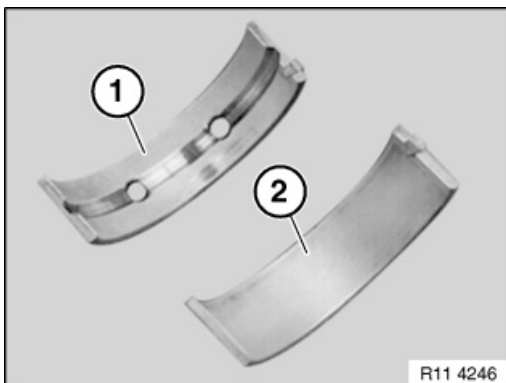
Bearing position (1) is at the output end (clutch end)

Determine main bearing colours; the designations on the crankcase and crankshaft are always required and can only be determined using the table.

A different bearing classification is necessary at bearing seat 5 on account of the central bolt on the timing chain drive.

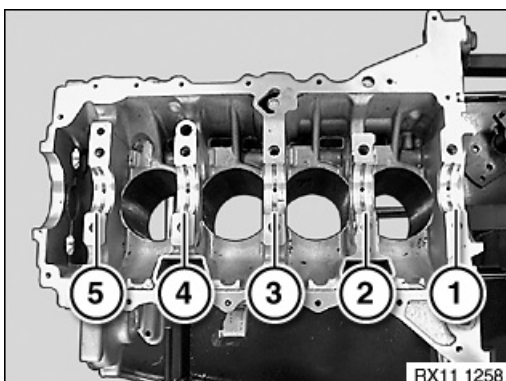
**Necessary preliminary tasks:**

- Remove crankshaft.

**Installation note:**

Bearing shell (1) with lubricant groove must be fitted in crankcase upper section.

Bearing shell (2) without lubricant groove must be fitted in crankcase lower section (bedplate).

**Important!**

Modified assignment of bearing positions.

Bearing position (1) is at the output end (clutch end)

Bearings (1 to 5).

Bearing (2) is a guide bearing.

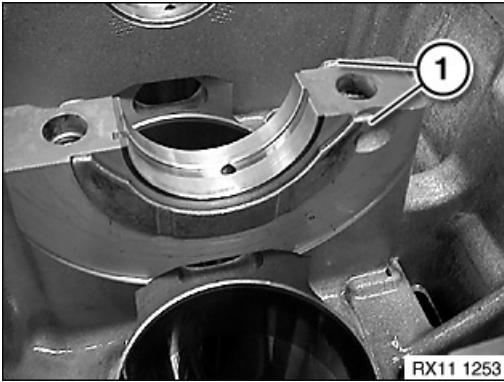
Important!

Clean sealing surfaces.

Do **not** clean sealing surfaces with a metal-cutting tool.

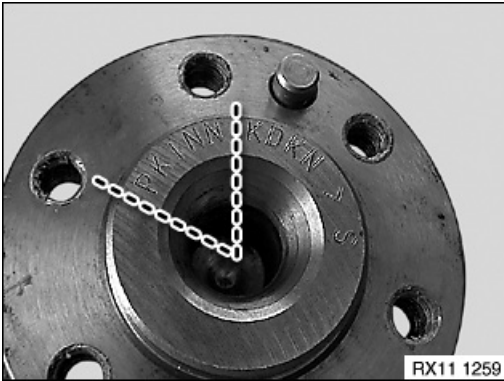
Only use special tool 11 4 470 to clean sealing surfaces.





Insert guide rings (1) in crankcase at bearing seat (2) with groove facing outwards.

If necessary, attach with engine oil to crankcase.



Bearing classification on crankcase upper and lower sections:

Bearing allocation 1 - 5: the designations on the crankshaft are always required.

Refer to the table for the colour code.

Example:

Bearing 1.	Letter P
Bearing 2.	Letter K
Bearing 3.	Letter I
Bearing 4.	Letter N
Bearing 5.	Letter N





Bearing classification on crankcase upper and lower sections:

Bearing allocation 1 - 5: the designations on the crankcase are always required.

Refer to the table for the colour code.

Example:

Bearing 1.	Letter T
Bearing 2.	Letter Q
Bearing 3.	Letter Q
Bearing 4.	Letter R
Bearing 5.	Letter R

Example: Crankshaft / crankcase.

Bearing (1):

Letter **P** on the crankshaft and letter **T** on the crankcase correspond to bearing colour codes for the crankcase **Or**= orange with lubricating groove.

Letter **P** on the crankshaft and letter **T** on the crankcase correspond to bearing colour codes for the crankcase lower section (bedplate) **Ge**= yellow without lubricating groove.

Bearing (2):

Letter **K** on the crankshaft and letter **Q** on the crankcase correspond to bearing colour codes for the crankcase **Or**= orange with lubricating groove.

Letter **K** on the crankshaft and letter **Q** on the crankcase correspond to bearing colour codes for the crankcase lower section (bedplate) **Or**= orange without lubricating groove.

Bearing (3):

Letter **I** on the crankshaft and letter **Q** on the crankcase correspond to bearing colour codes for the crankcase **Or**= orange with lubricating groove.

Letter **I** on the crankshaft and letter **Q** on the crankcase correspond to bearing colour codes for the crankcase lower section (bedplate) **Or**= orange without lubricating groove.

Bearing (4):

Letter **N** on the crankshaft and letter **R** on the crankcase correspond to bearing colour codes for the crankcase **Ge**= yellow without lubricating groove.

Letter **N** on the crankshaft and letter **R** on the crankcase correspond to bearing colour codes for the crankcase lower section (bedplate) **Ge**= yellow without lubricating groove.

Attention: See extra table.

Bearing (5):

Letter **N** on the crankshaft and letter **R** on the crankcase correspond to bearing colour codes for the crankcase **Ge**= yellow with lubricating groove.

Letter **N** on the crankshaft and letter **R** on the crankcase correspond to bearing colour codes for the crankcase lower section (bedplate) **Gr**= green without lubricating groove.





Crankshaft bearing colours, bearing positions 1–4

Sw = Black.
Gr = Green.
Ge = Yellow.
Or = Orange.
Br = Brown.

Table overview of bearing classification: Upper section, bearings 1 – 4

Crankshaft

Bearings 1-4		A	B	C	D	E	G	H	I	K	M	N	P	q	R	S	T	U
K U R b e L g e h ä U s e	A	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw
	B	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw
	C	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw
	D	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw
	E	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr
	G	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr
	H	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr
	I	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr
	K	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr
	M	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr
	N	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr
	P	Or	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr
	q	Br	Or	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge
	R	Br	Br	Or	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge
	S	Br	Br	Br	Or	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge
	T	Br	Br	Br	Br	Or	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge
	U	Br	Br	Br	Br	Br	Or	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge
	X	Br	Br	Br	Br	Br	Br	Or	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge
	Y	Br	Br	Br	Br	Br	Br	Br	Or	Or	Or	Or	Or	Or	Or	Or	Ge	Ge
	Z-Series	Br	Br	Br	Br	Br	Br	Br	Br	Or	Or	Or	Or	Or	Or	Or	Or	Ge

Table overview of bearing classification: Lower section, bearings 1 – 4

Crankshaft

Bearings 1-4		A	B	C	D	E	G	H	I	K	M	N	P	q	R	S	T	U
K U	A	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw
	B	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw	Sw
	C	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw
	D	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw
	E	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw
	G	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw
	H	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw
	I	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw



R b e L g e h ä U s e	K	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr
	M	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr
	N	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr
	P	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr
	q	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr
	R	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr
	S	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr
	T	Or	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr
	U	Br	Or	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge
	X	Br	Br	Or	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge
	Y	Br	Br	Br	Or	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge
	Z-Series	Br	Br	Br	Br	Or	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge



Crankshaft bearing colours, bearing position 5:

Sw = Black.

Gr = Green.

Ge = Yellow.

Or = Orange.

Br = Brown (only in crankcase upper section).

Table overview of bearing classification: Upper section, bearing 5

Crankshaft

Bearing 5		A	B	C	D	E	G	H	I	K	M	N	P	q	R	S	T	U
K U R b e L g e h ä U s e	A	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw
	B	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw
	C	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw	Sw
	D	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw
	E	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw
	G	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw
	H	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw
	I	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw
	K	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw
	M	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr
	N	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr
	P	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr
	q	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr
	R	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr
	S	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr
	T	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr
	U	Or	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr
	X	Br	Or	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge
	Y	Br	Br	Or	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge



Z-Series	Br	Br	Br	Or	Or	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge
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Table overview of bearing classification: Lower section, bearing 5
Crankshaft

Bearing 5		A	B	C	D	E	G	H	I	K	M	N	P	q	R	S	T	U
K U R b e L g e h ä U s e	A	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw
	B	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw
	C	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw
	D	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw
	E	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw
	G	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw	Sw	Sw
	H	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw	Sw
	I	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw	Sw
	K	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw	Sw
	M	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw	Sw
	N	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw	Sw
	P	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw	Sw
	q	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Sw
	R	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr	Gr
	S	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr	Gr
	T	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr	Gr
	U	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr	Gr
	X	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr	Gr
	Y	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr	Gr
	Z-Series	Or	Or	Or	Or	Or	Or	Or	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Ge	Gr	Gr



Install crankcase lower section.
Assemble engine.



**Special tools required:**

- 00 9 120
- 11 4 471
- 11 4 472
- 11 6 251
- 11 6 252
- 23 1 240

**Warning!**

Rotating components (danger of injury!).

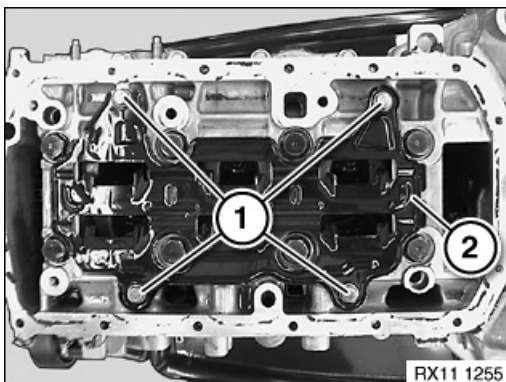
It is absolutely essential to follow the procedure described below and the instructions on handling the special tools.

**Important!**

Jointing torque and angle of rotation must be observed without fail (**risk of damage**).

**Necessary preliminary tasks:**

- Remove engine.
- Mount engine on assembly stand.
- Remove vibration damper.
- Removing oil sump.
- Remove oil pump.
- Remove timing chain.
- Remove cylinder head.
- Remove flywheel.



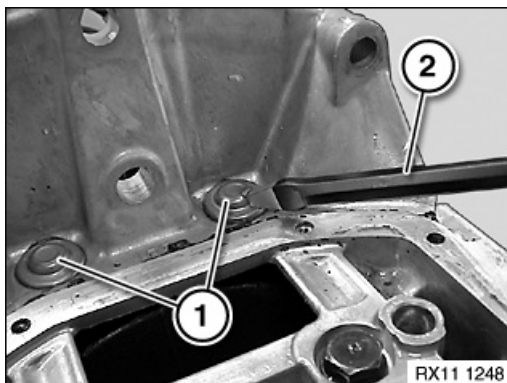
Release screws (1).

Tightening torque 11 13 3AZ.

Remove oil deflector (2).

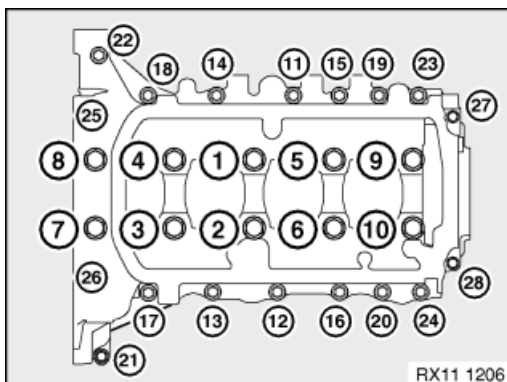
Remove all pistons.





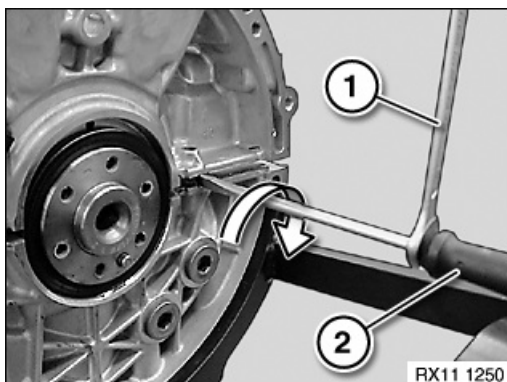
Important!
Risk of damage! on crankcase.

Drive out cover plates (1) with a cross-cut chisel (2).

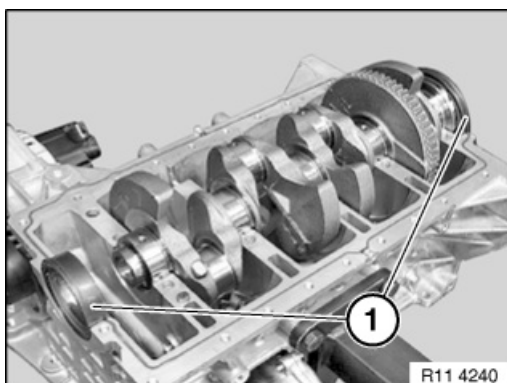


Release screws (28 to 11).

Release screws (10 to 1).

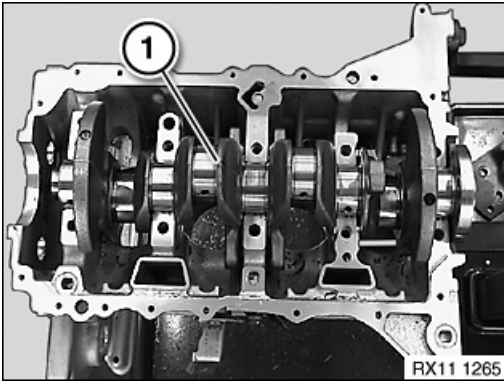


Release crankcase lower section in direction of arrow with a regular screwdriver (2) and an open-end spanner (1) at press-off lug.



Remove both radial shaft seals (1). *Note:*
 Graphic N43.





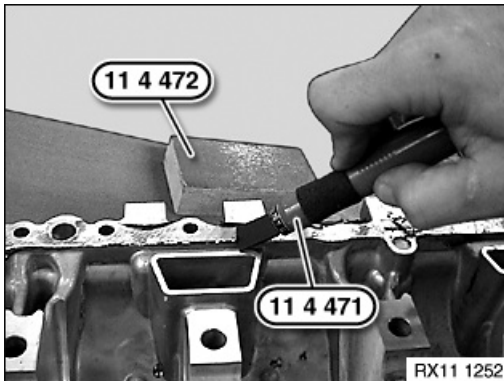
Remove crankshaft (1).

Important!

Remove crankshaft with aid of a second person.

Weight of crankshaft approx. 19 kg.

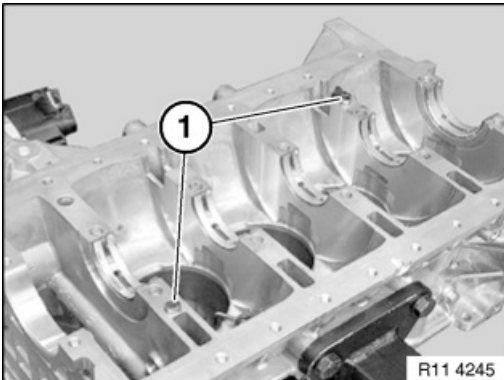
Remove main bearing shells, replace if necessary.



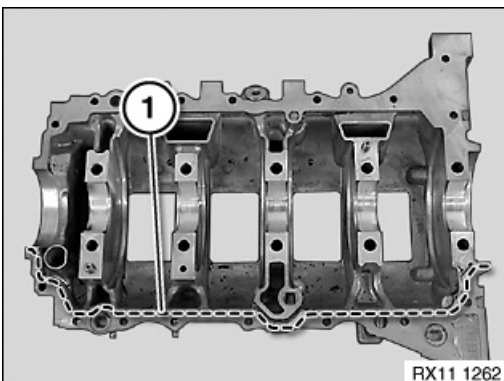
Important!

Do not clean sealing surfaces with a metal-cutting tool.

Clean sealing surfaces with special tools 11 4 471 and 11 4 472 .



Check fitting bush (1) for damage and correct seating.



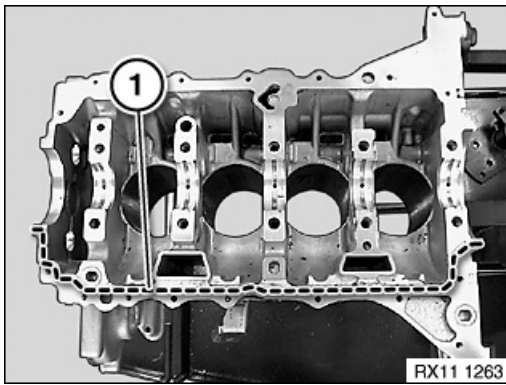
Apply a sealing bead (1) on the lower crankcase section (see graphic) with Loctite 5970 sealing compound.

Overview of consumables (2.2).

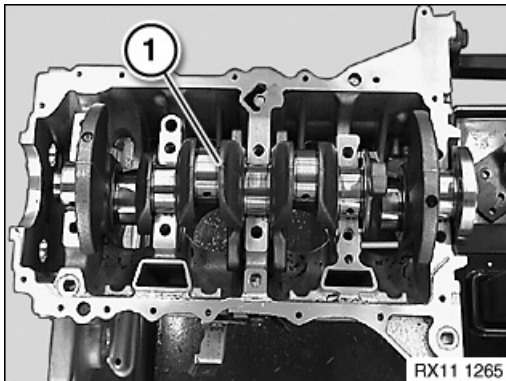
Installation note:

Follow manufacturer's instructions (Loctite).

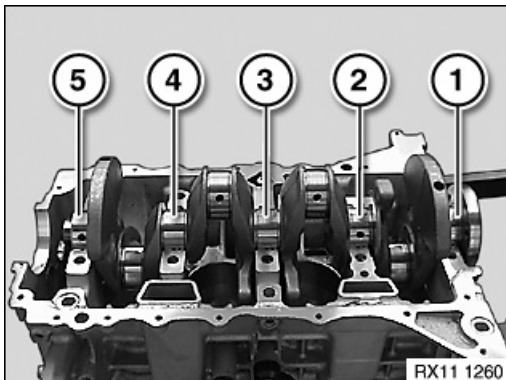




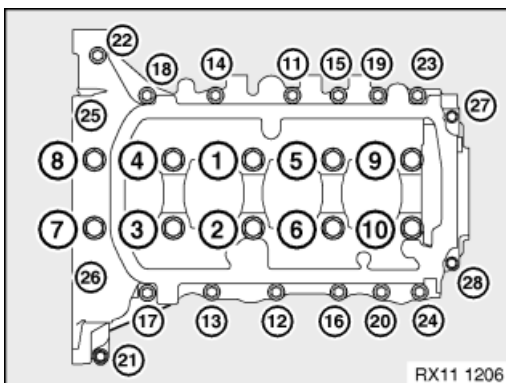
Apply a sealing bead (1) on the upper crankcase section (see graphic) with Loctite 5970 sealing compound. *Installation note:*
Follow manufacturer's instructions (Loctite).



Insert crankshaft (1). **Important!**
Rotating component (danger of injury!)
Insert crankshaft with aid of a second person.
Weight of crankshaft approx. 19 kg.

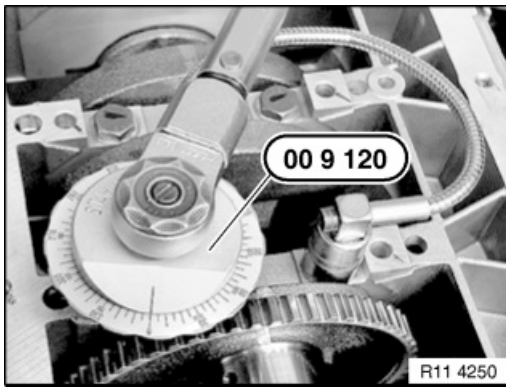


Lubricate all bearings from 1 to 5 with engine oil.
Install crankcase lower section.

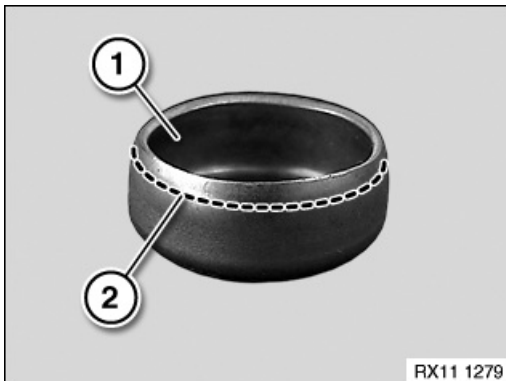


Tighten bolts (1 to 10).
Tightening torque: 11 11 1AZ.
Tighten bolts (11 to 28).
Tightening torque: 11 11 2AZ.



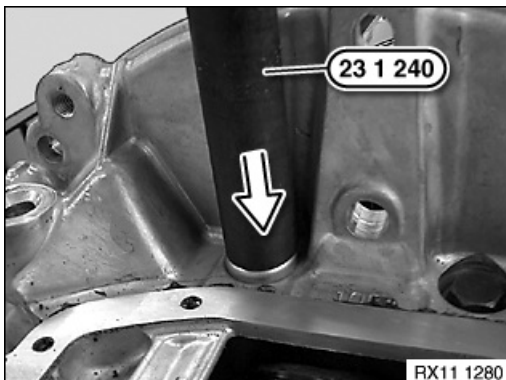


Tighten bolts exclusively with special tool 00 9 120 **.Important!**
Jointing torque and angle of rotation must be observed without fail.

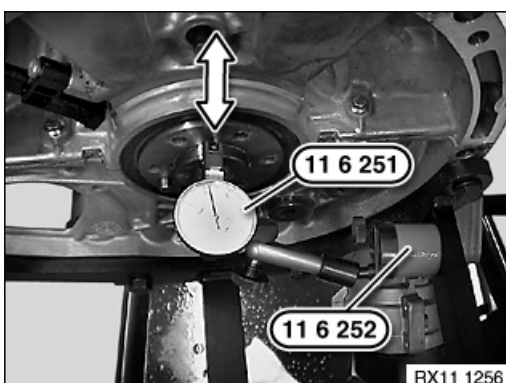


To prevent oil leakage, apply a thin coating of Loctite 648 to cover sleeve (1) in area (2).

Overview of consumables (2.3).



Knock in cover sleeves with special tool 23 1 240 as far as they will go.



Determine crankshaft side clearance.

Affix special tool 11 6 252 with magnet.

Set special tool 11 6 251 to zero.

Press crankshaft in direction of arrow to the limit position.

Refer to Technical Data.



Replace radial shaft seal at front.

Replace radial shaft seal at rear.

Assemble engine.

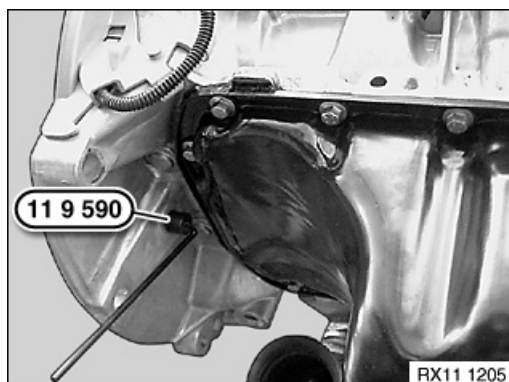


**Special tools required:**

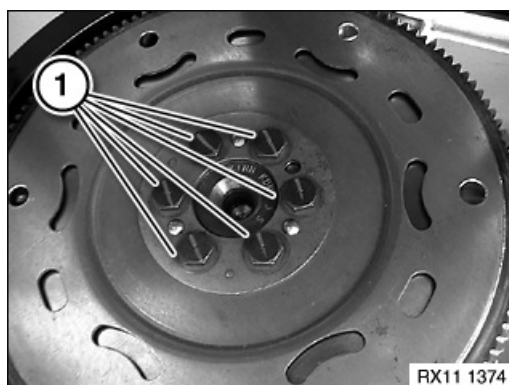
- 11 9 590

**Necessary preliminary work:**

- Remove transmission.
- Remove clutch.



Lock flywheel with special tool 11 9 590 .

**Flywheel for automatic transmission.**

Release flywheel bolts (1).

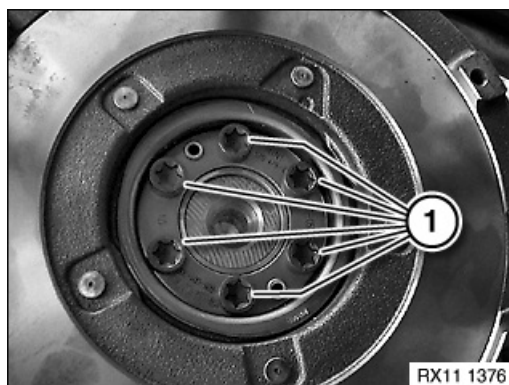
Tightening torque: 11 22 1AZ.

Installation note:

Flywheel is secured with a dowel pin.

Fit new flywheel bolts.

Clean crankshaft thread for flywheel bolts.

**Flywheel for manual gearbox.**

Flywheel with and without dual-mass: release flywheel bolts (1).

Tightening torque: 11 22 2AZ.

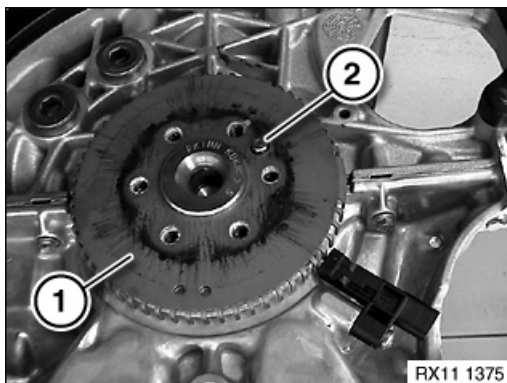
Installation note:

Flywheel is secured with a dowel pin.

Replace flywheel bolts (1).

Clean crankshaft thread for flywheel bolts.





Installation note:

Sensor gear (1) is loose on crankshaft and is first secured to flywheel.

Dowel pin (2) for securing sensor gear/flywheel.



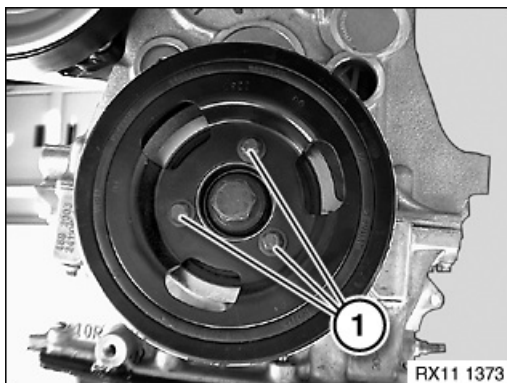
Assemble engine.





Necessary preliminary tasks:

- Remove right wheel arch cover.
- Remove drive belt.



Release screws (1).

Tightening torque: 11 23 1AZ.

Remove vibration damper.



Assemble engine.



11 24 571

Replace all connecting rod bearings (N18)



Important!

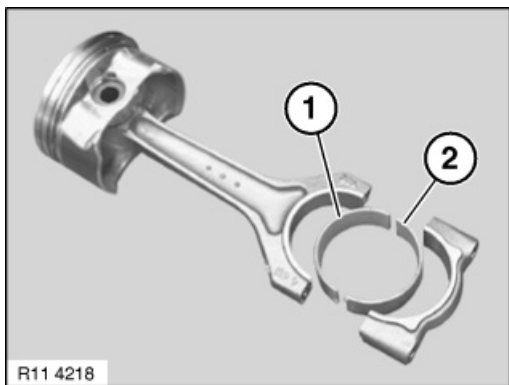
All crank pins are connected with the crankshaft.

Modified procedure; the bearing shell colours are the same at the top and bottom.



Necessary preliminary work:

- Remove all pistons.



Install new connecting rod bearing shells.

Insert connecting rod bearing shells (1 and 2).



Assemble engine.



**Special tools required:**

- 00 9 120
- 11 9 620
- 11 9 670

**Warning!**

Safety goggles must be worn when performing repair work on the gudgeon pin circlip.

**Important!**

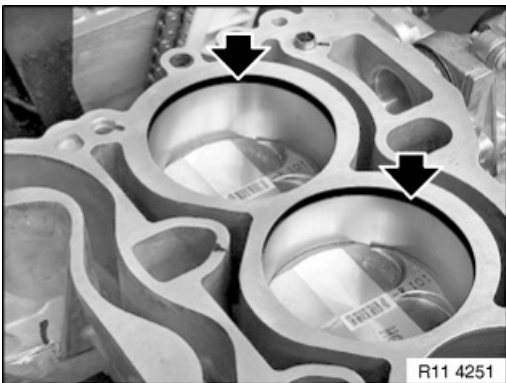
If pistons, connecting rods and bearing shells are reused, they must be reinstalled in the same places.

Connecting rods and connecting rod bearing caps are denoted with the same pairing letters; mixing them up will result in engine damage.

Piston and gudgeon pins are paired and must not be fitted individually.

*Necessary preliminary tasks:*

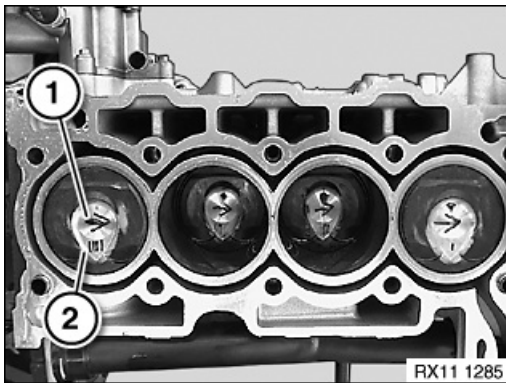
- Remove engine.
- Mount engine on assembly stand.
- Remove intake plenum.
- Remove cylinder head.
- Remove oil sump.
- Remove oil pump.

*Note:*

In event of heavy oil carbon residue:

Carefully remove oil carbon residue from cylinder wall. *Note:* Graphic shows N46.





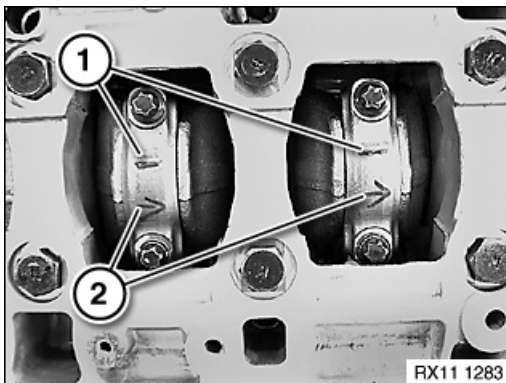
Note:

Mark all pistons and connecting rods with a pen prior to removal.

Example:

Direction of arrow (1) points to camshaft drive.

Cylinder allocation (2) per cylinder.



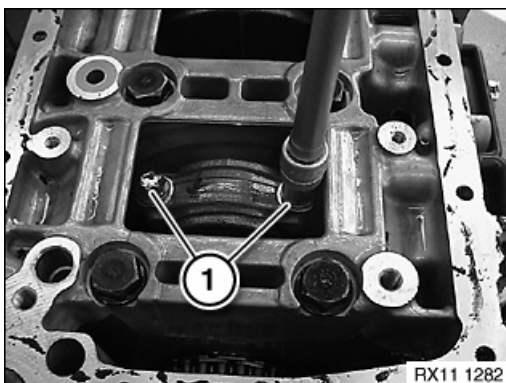
Note:

Mark all pistons and connecting rods with a pen prior to removal.

Example:

Mark cylinder allocation (1) per cylinder.

Direction of arrow (2) points to camshaft drive.



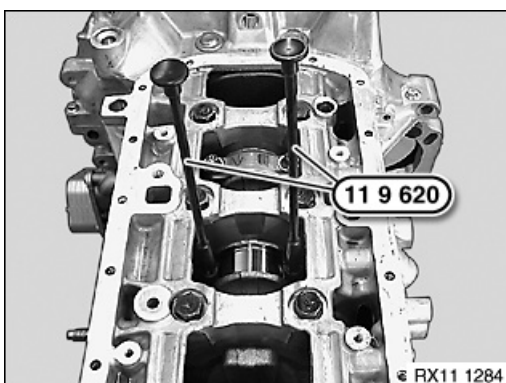
Release connecting rod bolts (1).

Tightening torque, 11 24 1AZ.

Remove connecting rod bearing cap.

Important!

Connecting rods and connecting rod bearing caps are denoted with the same pairing letters; mixing them up will result in engine damage.



Important!

Risk of damage! to oil spray nozzle.

11 9 620 Attach special tool in connecting rod.

Press out connecting rod and piston to cylinder head side.



Warning!

Safety goggles must be worn for the next operation.





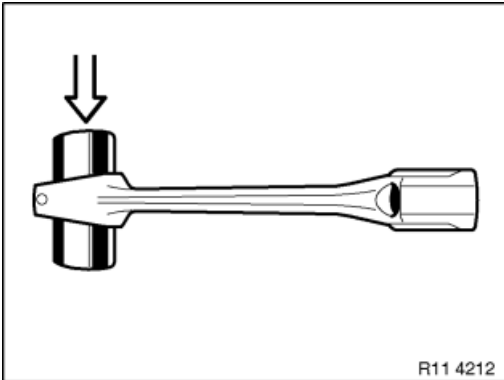
Warning!

Safety goggles must be worn.

Important!

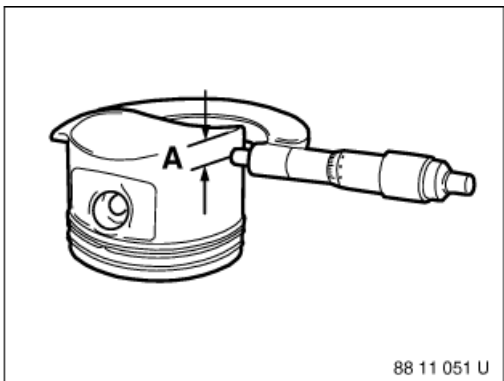
Piston and gudgeon pins are paired and must not be fitted individually.

Lever out gudgeon pin circlip with a screwdriver in direction of arrow.



If necessary, replace connecting rods. *Installation note:*

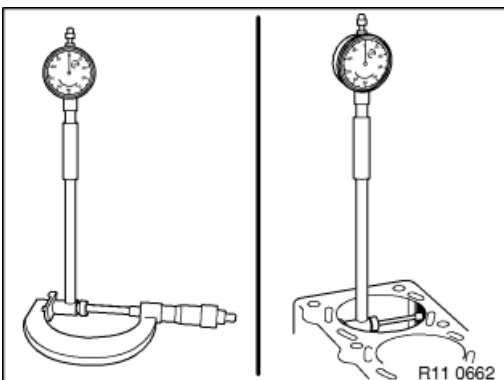
The gudgeon pin must be able to be pressed through the bush by hand with little force and must not display any significant play.



Measure piston installation clearance:

Measure piston diameter with micrometre at measuring point A from lower edge of piston and offset by 90° to piston pin axis.

Piston diameter at measuring point A.



Adjust micrometre to cylinder bore of engine block. Set internal measuring device on micrometre to zero. Measure bottom, centre and top of cylinder bore in direction of travel and direction of rotation.

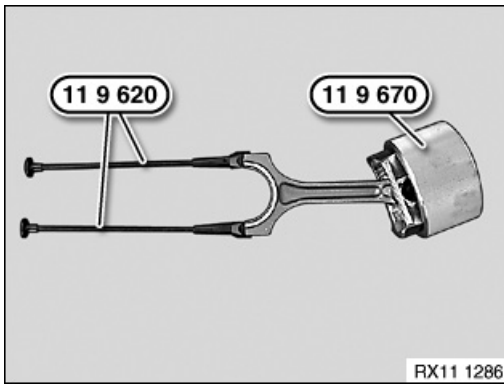
Diameter of cylinder bore.

Piston installation clearance.

Total permissible wear clearance.

If necessary, replace piston.





Install all piston rings.

Install all bearing shells.

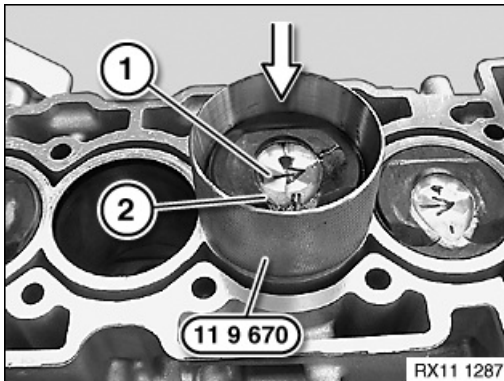
Oil piston and piston rings.

11 9 670 Pre-install piston in special tool .

Screw special tool 11 9 620 into connecting rod.

Installation note:

11 9 620 Check protective lugs on special tool for correct position and damage.



Insert piston with connecting rod in cylinder.

Important!

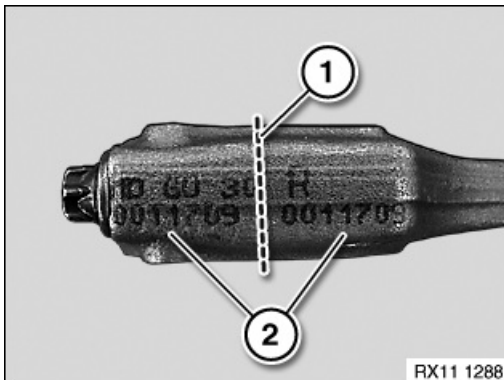
Risk of breakage of piston rings.

Press in piston with finger pressure only, do not drive in (see arrows).

Insert piston (1) so that arrow on piston crown points to camshaft drive.

If reusing the pistons, assign cylinder allocation (2) to correct cylinder.

Press in piston with special tool 11 9 670 .



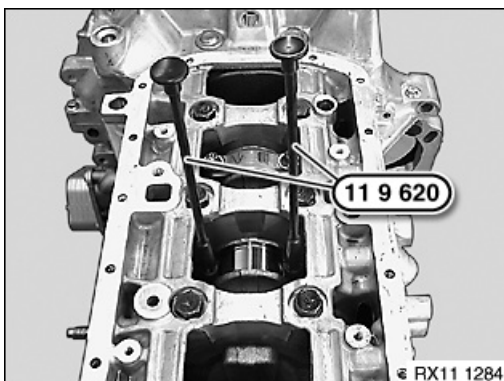
Important!

Point of fracture (1) on connecting rod.

Conrod and connecting rod bearing cap are identified with pairing letters (2) and must not be mixed up.

Mixing them up or incorrect assembly of the connecting rod bearing cap on the connecting rod will result in **engine damage**.

Both pairing letters (2) must be together on one side.

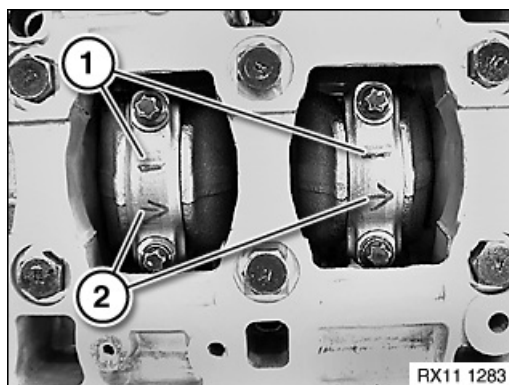


Apply a light coat of oil to crankshaft journals.

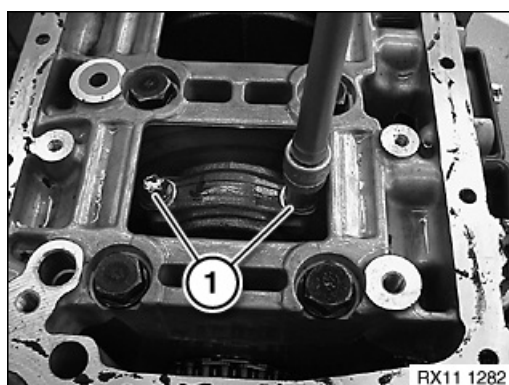
Attach connecting rod to crankshaft journal.

Remove special tool 11 9 620 .





Fit bearing caps (2) so that pairing letters match up.
 Check cylinder identification markings (1).
 Direction of arrow (2) points to camshaft drive.



Install new connecting rod bolts (1).
 00 9 120 Carry out torsion angle adjustment of connecting rods with special tool .
 Tightening torque: 11 24 1AZ



Assemble engine.

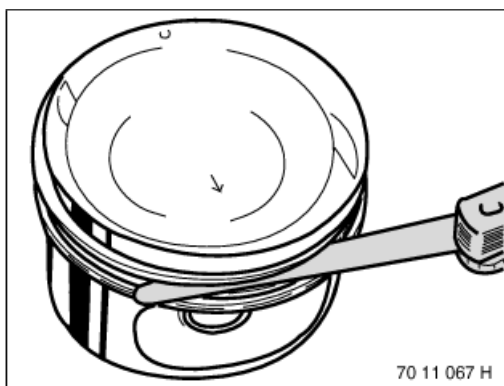


**Special tools required:**

- 11 9 670

**Necessary preliminary work:**

- Remove all pistons.

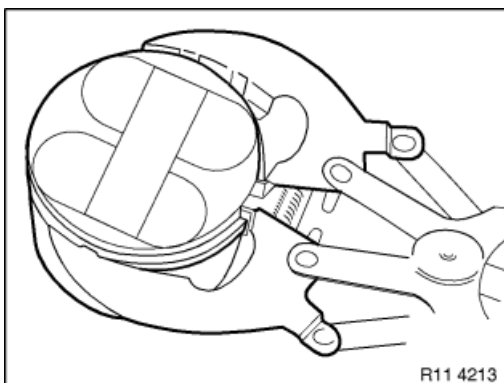


Measuring side clearance of piston rings in piston ring groove.

Technical Data.

Note:

It is not possible to measure the axial clearance of the oil scraper rings.



Remove compression ring and stepped ring upwards with piston ring pliers.

Oil scraper ring comprises two steel band rings and a bearing spring.

Note:

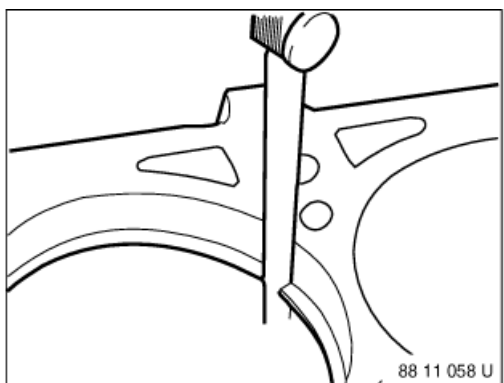
Oil scraper ring cannot be removed with piston ring pliers.

Put aside piston rings in correct sequence and installation position.

It might not be possible to find the identification on used piston rings.

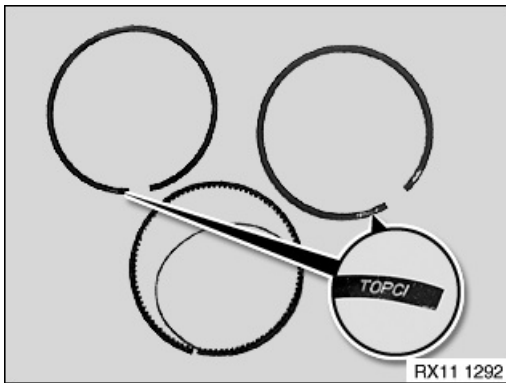
Installation note:

New pistons may only be installed together with new piston rings.



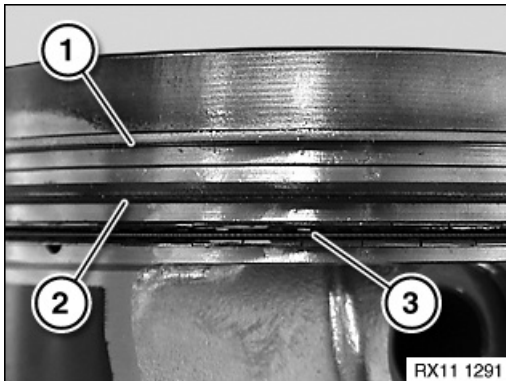
Determine end clearance with a feeler gauge.





Installation note:

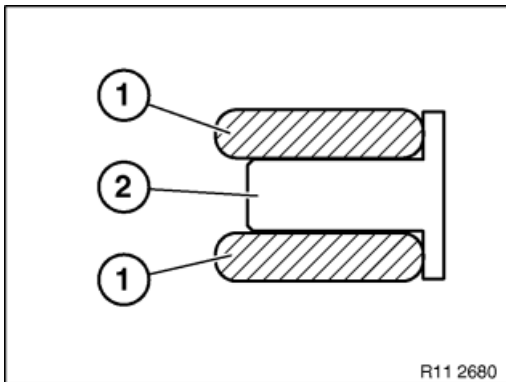
Piston rings with "TOP" identification must point to piston crown.



Installation note:

Piston rings with "TOP" identification must point to piston crown.

1. Plain rectangular compression ring
2. Lug face ring
3. Two-part oil scraper ring

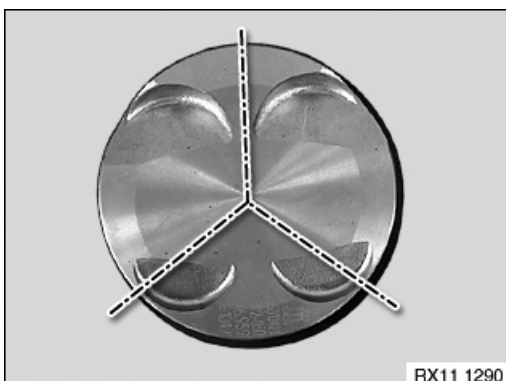


Note:

Oil scraper ring comprises two steel band rings (1) and a bearing spring (2).

Installation note:

Insert bearing spring (2) into piston ring groove and then fit steel band rings (1) so that contact points are offset by approx. 120°.



Offset the contact points (1) of the piston rings by approx. 120° to each other but do not position above the gudgeon pin boss.

Coat special tool 11 9 670 with sufficient engine oil **Risk of damage!** to piston rings!

Note:

See graphic.



Assemble engine.

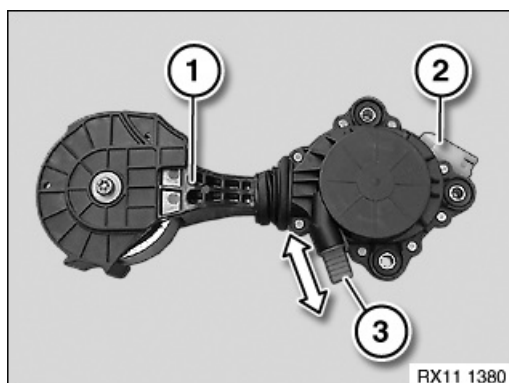


**Special tools required:**

- 11 9 581
- 11 9 583

**Necessary preliminary tasks:**

- Remove right wheel arch cover



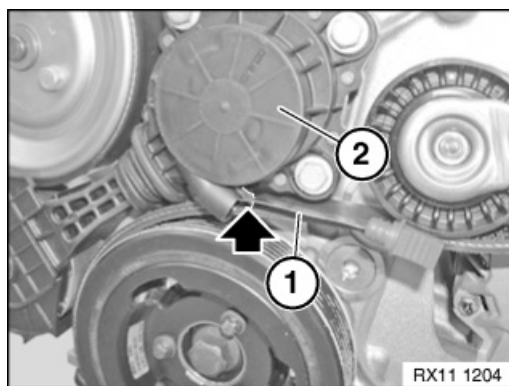
Pull out friction wheel with mechanical unlocking (3) in direction of arrow and lock on locking hook.

Friction gear (1) lifts mechanically off belt drive.

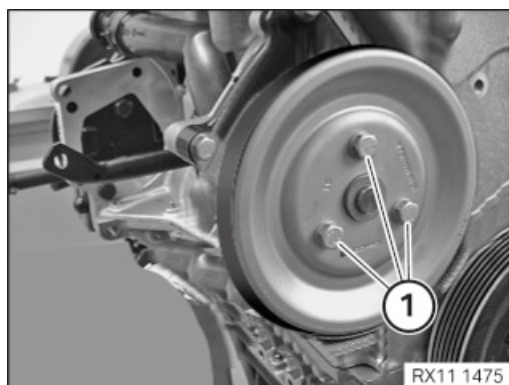
Disconnect plug connection (2) on friction wheel.

Note:

Picture shows friction wheel removed.

**Move friction gear (2) into service position with max. 50 N.**

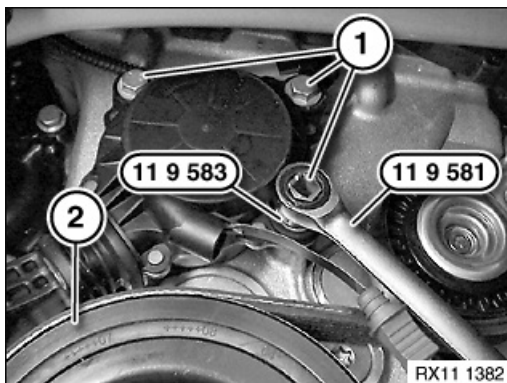
To secure friction gear in servicing position, suspend tensioning strap (1) on housing (2).



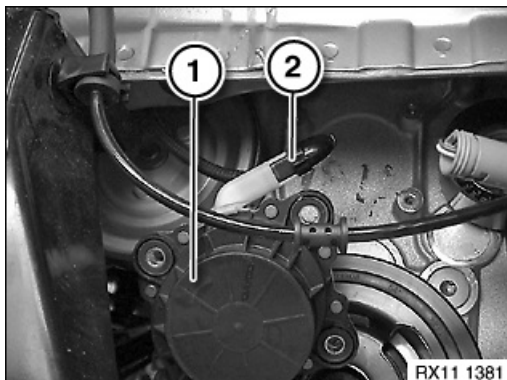
Undo bolts (1) with special tool 11 9 581 and 11 9 583 .

Tightening torque: 11 51 2AZ.

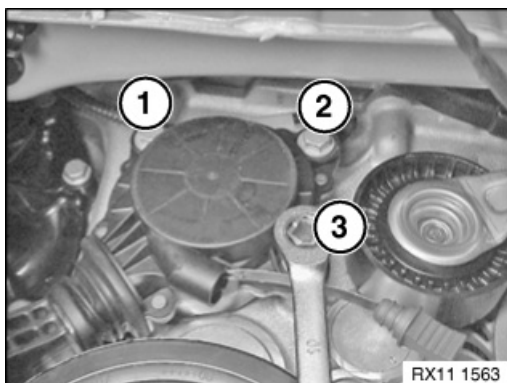




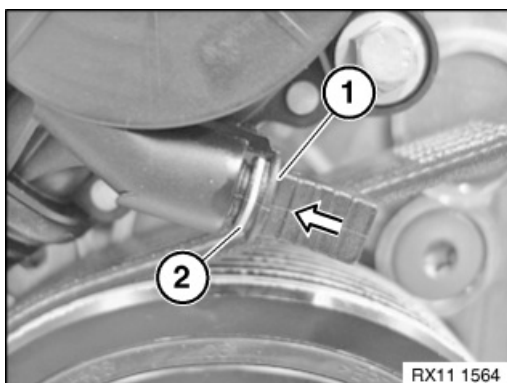
Undo bolts (1) with special tool 11 9 583 and 11 9 581 .*Note:*
Drive belt does not have to be removed.



Remove friction wheel (1) towards bottom.
Disconnect plug connection (2).



Installation note:
Bolt down friction gear in sequence 1 to 3
Tightening torque: 9 Nm.



Installation note:
Slowly retract tensioning strap (1) in direction of arrow.
Plastic ring (2) must engage in friction gear housing.



Assemble engine. *Installation note:*
Check cable routing for correct installation position (**risk of damage!**).



**Special tools required:**

- 00 6 100
- 00 6 150
- 00 6 080
- 11 6 210
- 11 9 583
- 11 9 581

**Warning!**

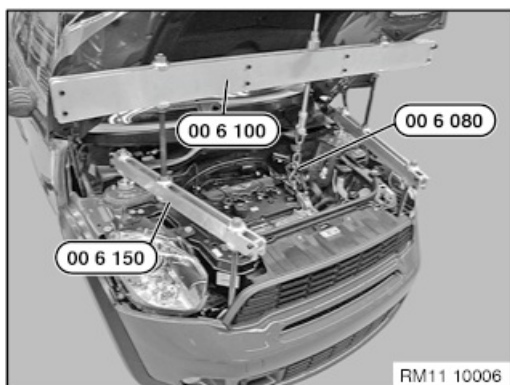
Danger of injury!

Observe following instructions relating to special tool:

1. Prior to each use, check the special tools for defects, modifications and operational reliability.
2. Damaged/modified special tools must not be used!
3. No changes or modifications may be made to the special tools!
4. Keep special tools dry, clean and free of grease.

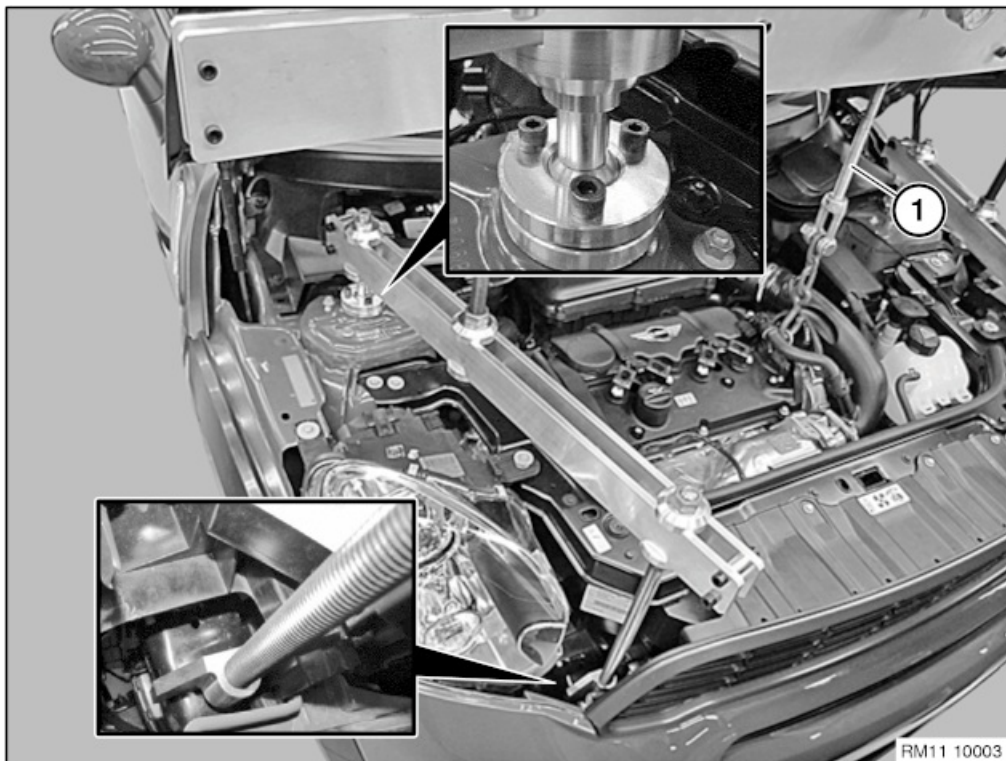
**Necessary preliminary work:**

- Remove right wheel arch cover



With the aid of an assistance, place cross member 00 6 100 and supports 00 6 150 on spring strut dome and bumper support.



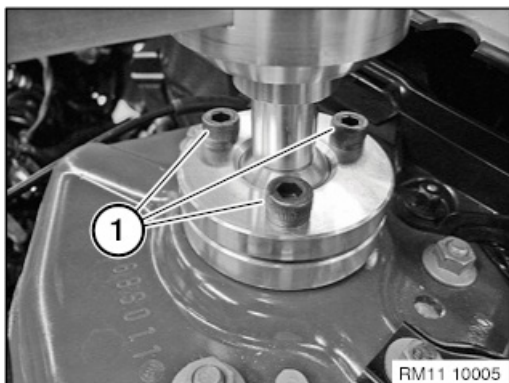


Align cross member 00 6 150 on spring strut dome and bumper support.

Slacken hexagon socket screw until the rests can be moved.

Align cross member 00 6 150 such that spindle (1) is correctly positioned over suspension lug.

Attach hook 00 6 080 in the suspension lug.



After aligning the special tool, tighten bolts (1).



Attention!

Avoid a change of engine position in the transverse or longitudinal direction!

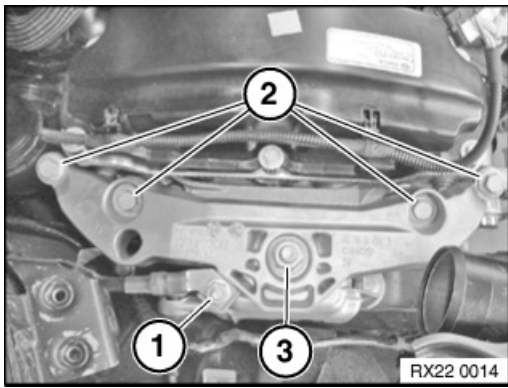
Always make sure there is sufficient clearance between the engine (or its add-on parts) and the body.



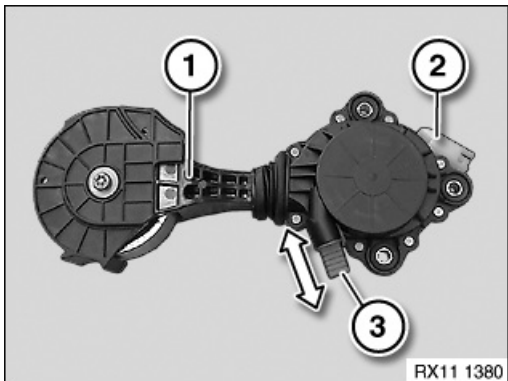
Attention!

Complete the following tasks without fail before raising the engine.

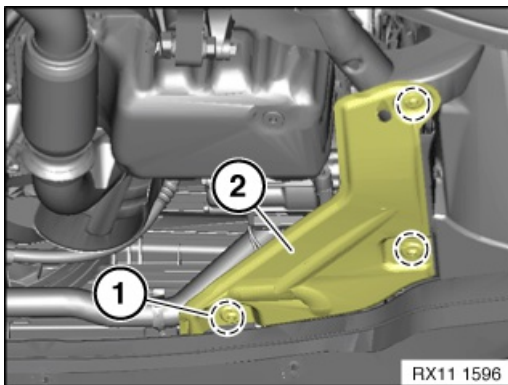




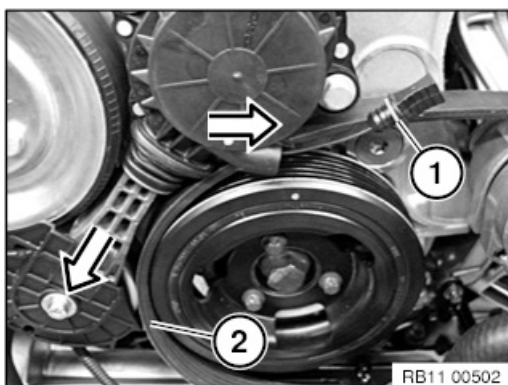
Release nut (1) and remove ground strap.
 Unfasten screws (2).
 Unscrew nut (3).
 Remove engine mounting bracket.



Pull out friction wheel with mechanical unlocking (3) in direction of arrow and lock on locking hook.
 Friction wheel (1) lifts mechanically from belt drive.
 Plug connection (2) on friction wheel.
Note:
 Graphic shows friction wheel removed.



Release screws (1).
 Remove (2) belt pulley cover.



Move friction wheel into service position.

In order to release the power transmission between belt pulley and coolant pump, it is necessary to move the friction wheel into the service position.

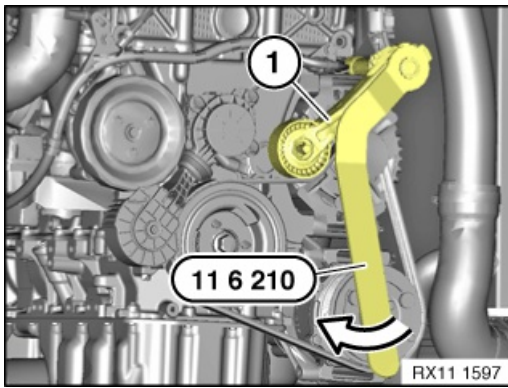
Pull service strap (1) in direction of arrow until friction wheel is separated from belt pulley.

Drive belt (2) can now be removed.

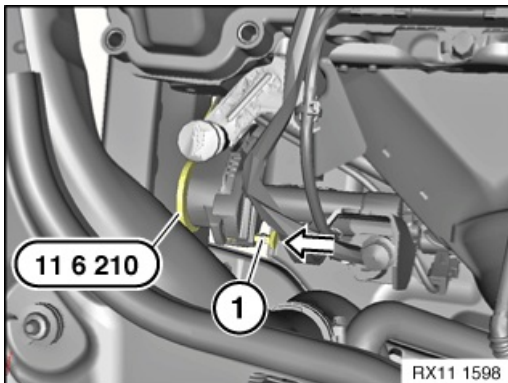
Installation note:

Service strap (1) must be exactly inserted and locked before start-up.





Bring belt tensioner (1) into assembly position in direction of arrow using special tool 11 6 210 .*Note:*
Figure and description on the removed engine for better illustration.



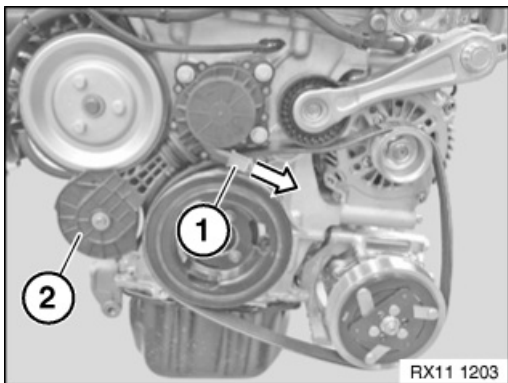
Secure working position of belt tensioner by sliding locating pin (1) in direction of arrow.

In so doing, grasp the belt tensioner through the opening in the wheel arch.

Warning!

Danger of injury!

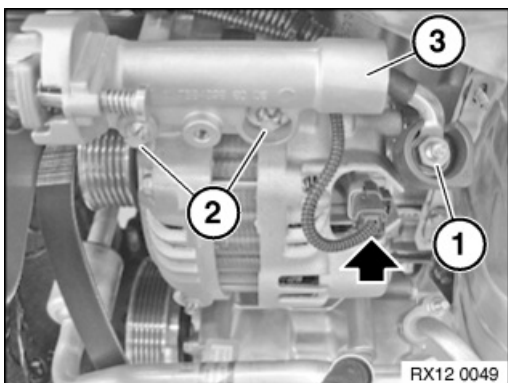
Remove special tool 11 6 210 again from belt tensioner.



Move friction wheel (2) into service position.

In order to release the power transmission between crankshaft and coolant pump, it is necessary to move the friction gear (2) into the service position.

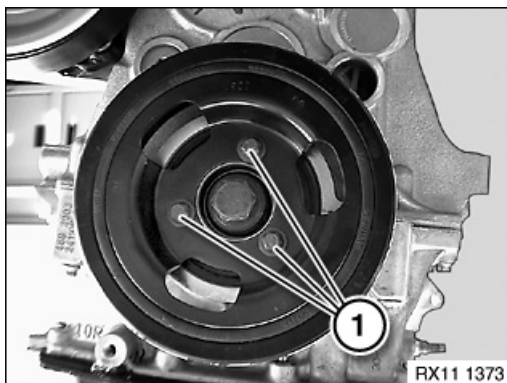
Pull handle (1) in direction of arrow until friction gear (2) is separated from belt pulley.



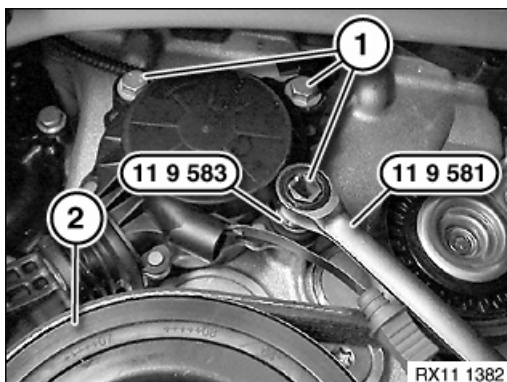
Unfasten screws (2).

Release tensioning device (3) with the screws by around 5 cm.

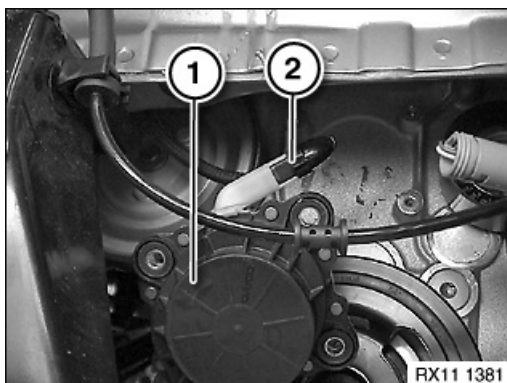




Release screws (1).
Remove vibration damper.



Undo bolts (1) with special tool 11 9 583 and 11 9 581 .
Remove friction wheel (2) downwards.

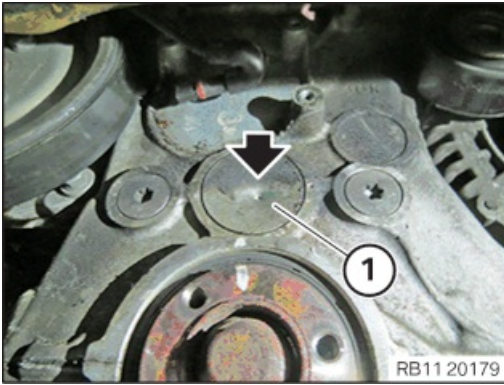


Remove friction wheel (1) towards bottom.
Disconnect plug connection (2).

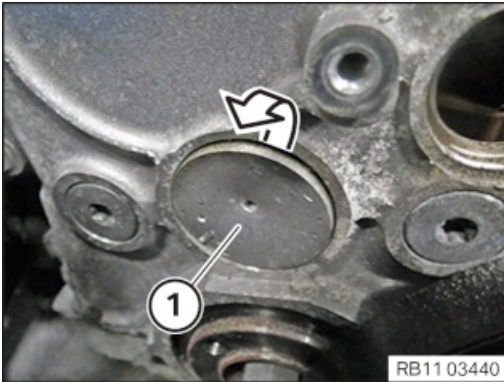


Sealing cap (1) are made of aluminium. *Installation note:*
Aluminium sealing caps (1) must be bonded when installed.

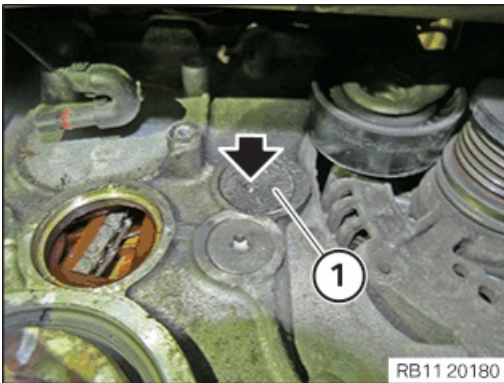




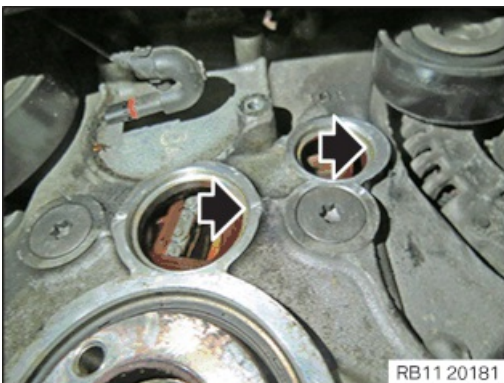
Forcefully drive out sealing cap (1) in the middle with a centre punch using a 500 g hammer.



Sealing cap (1) can now be removed in direction of arrow.

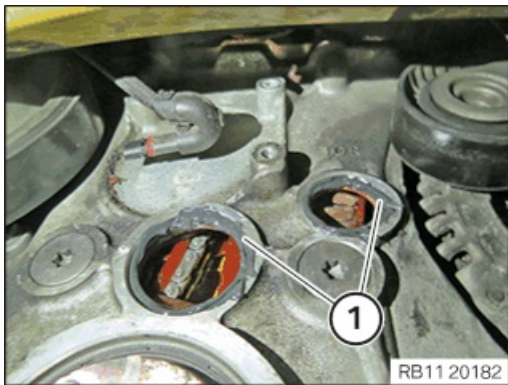


Forcefully drive out sealing cap (1) in the middle with a centre punch using a 500 g hammer.



Clean sealing surfaces with a BMW brake cleaner.

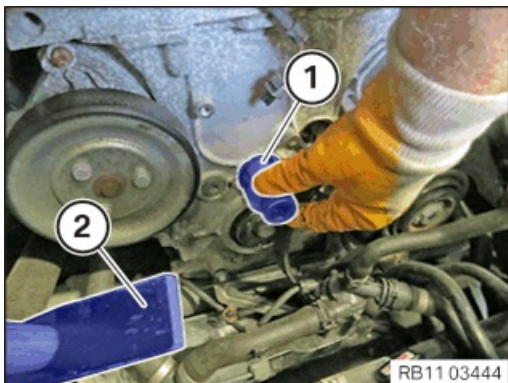




Apply a thin, even layer of sealing compound 2.2 to the sealing surfaces (1).



Different sizes (2) are required to drive in the sealing cap (1).



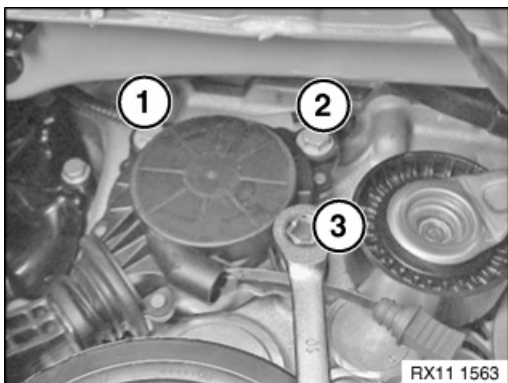
Drive in the sealing cap with a matching adapter (1) up to limit position using a hammer (2).

Graphic N13.



Assemble engine. *Installation note:*

Check cable routing for correct installation position (**risk of damage!**).

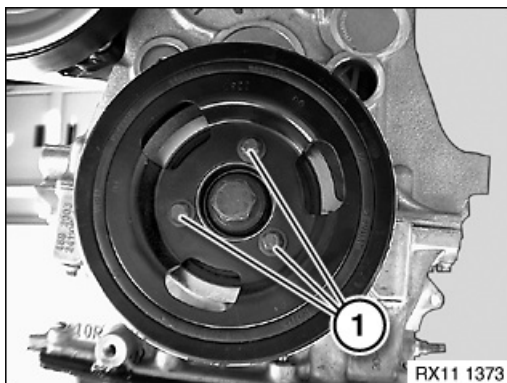


Installation note:

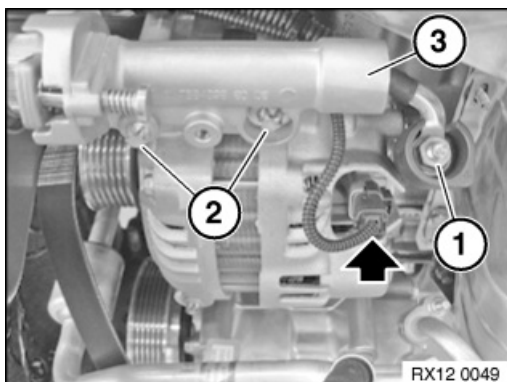
Follow the sequence 1 to 3 for the screw connection of the friction wheel.

Tightening torque: 9 Nm.

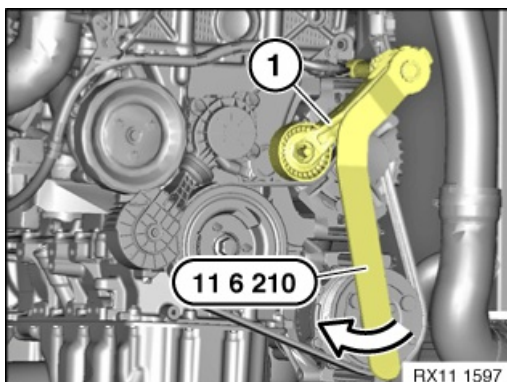




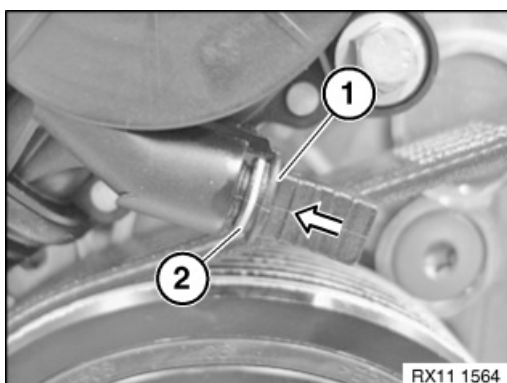
Attach vibration damper.
Secure screws (1).
Tightening torque: 11 23 1AZ.



Position tensioning device (3).
Secure screws (2).
Tightening torque: 11 28 1AZ.

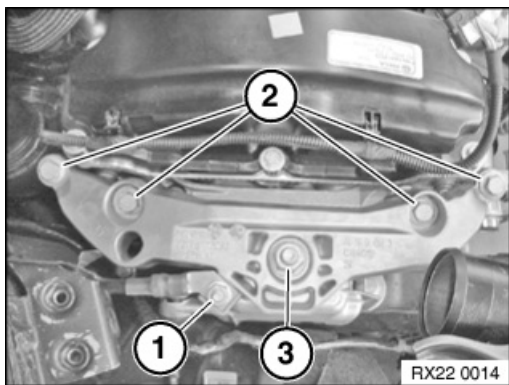


Position drive belt .
Pretension belt tensioner (1) in direction of arrow.
Remove belt tensioner (1) with special tool 11 6 210 .



Installation note:
Slowly retract tensioning strap (1) in direction of arrow.
Plastic ring (2) must engage in friction gear housing.





Position the engine mounting bracket.

Tightening torque 22 11 7AZ.

Unfasten screws (2).

Tightening torque 22 11 2AZ.

Unscrew nut (3).

Tightening torque 22 11 1AZ.



Necessary preliminary work:

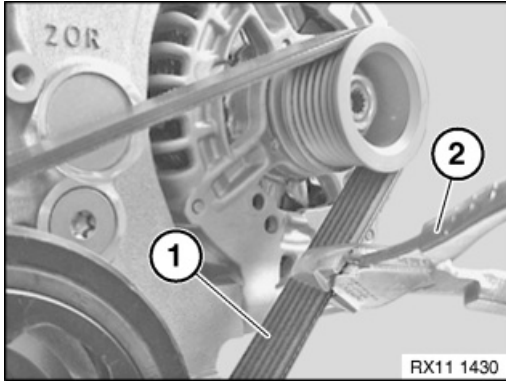
- Install right wheel arch cover.



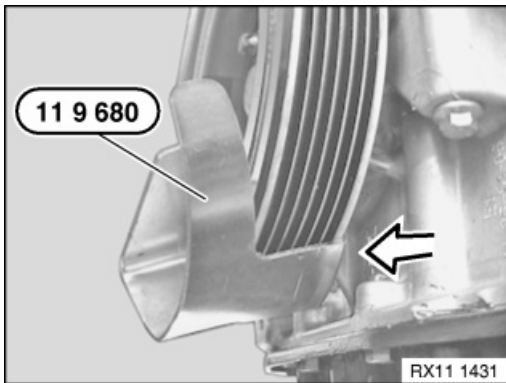


Necessary preliminary tasks:

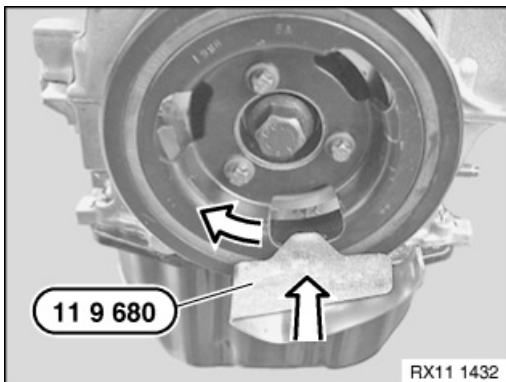
- Remove right wheel arch cover.
- Remove friction gear.



Cut through drive belt (1) with a suitable tool (2).

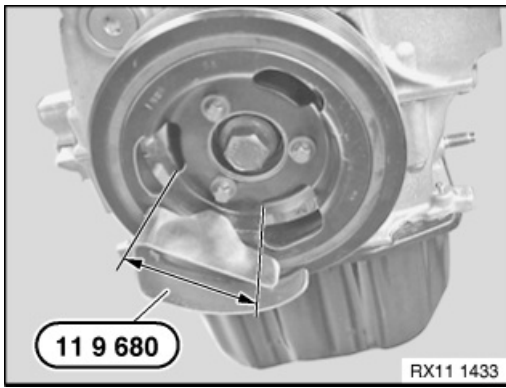


Position supplied tool (1) on vibration absorber (see arrow).

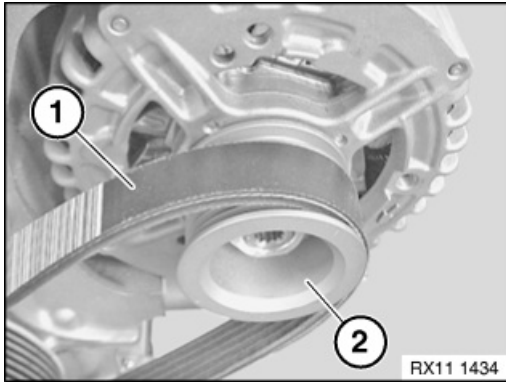


Attach mounting tool in direction of arrow and slide further in direction of arrow.

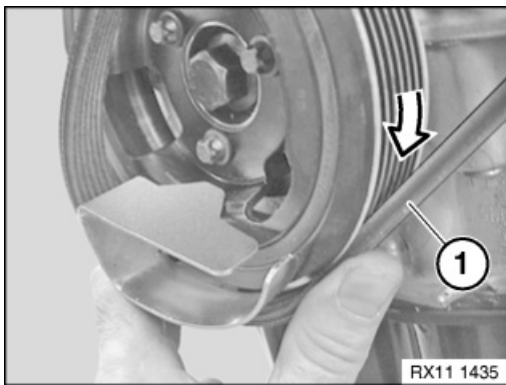




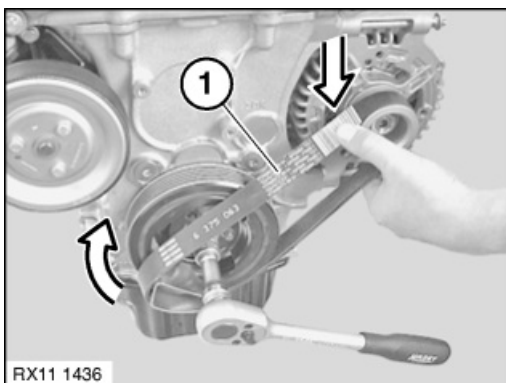
Bring mounting tool (1) on vibration absorber into installation position.



Place the drive belt (1) onto alternator (2).



Place drive belt (1) in direction of arrow on vibration absorber. *Note:* See graphic.

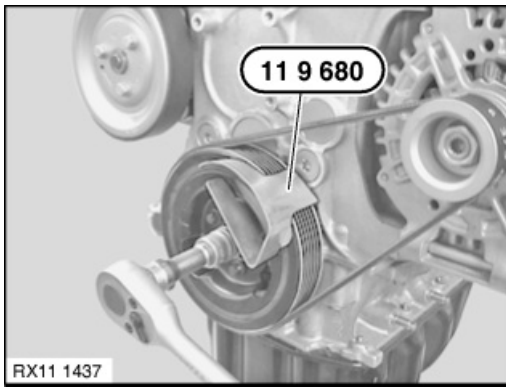


Turn vibration absorber in direction of arrow.

Press the drive belt (1) inwards by hand or with a mounting lever (see arrow).

Important!
Danger of injury!





Turn vibration absorber until the drive belt is fully engaged.
Remove mounting tool (1) from vibration absorber.

Note:

Mounting tool is no longer needed.



Reassemble the vehicle.

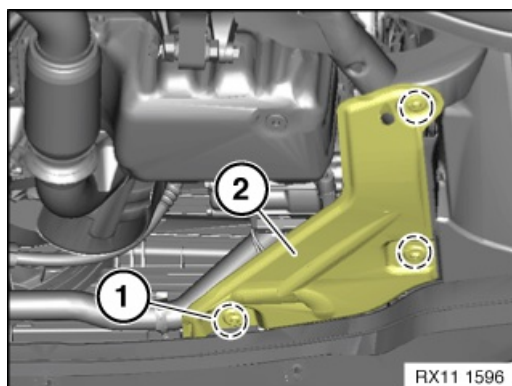


**Special tools required:**

- 11 6 210

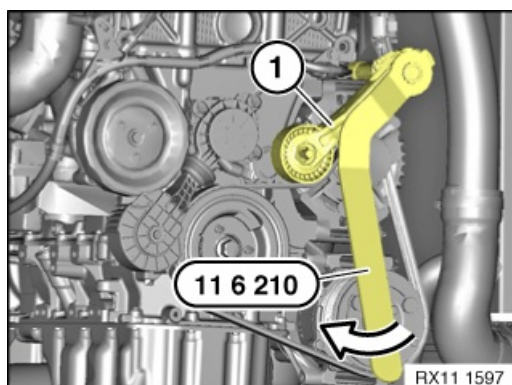
**Necessary preliminary tasks:**

- Remove right wheel arch cover



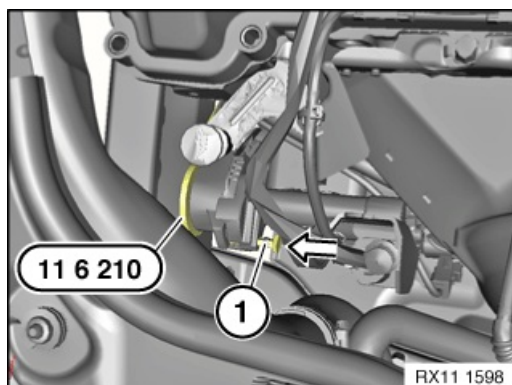
Release screws (1).

Remove (2) belt pulley cover.



Bring belt tensioner (1) into assembly position in direction of arrow using special tool 11 6 210 .*Note:*

For purposes of clarity, the illustration shows and description refers to the removed engine.



Secure working position of belt tensioner by sliding locating pin (1) in direction of arrow.

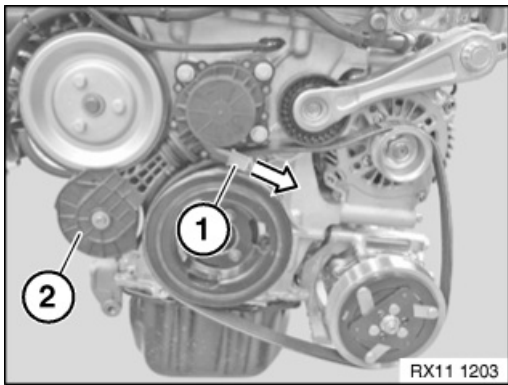
In so doing, grasp the belt tensioner through the opening in the wheel arch.

Warning!

Danger of injury!

Remove special tool 11 6 210 again from belt tensioner.

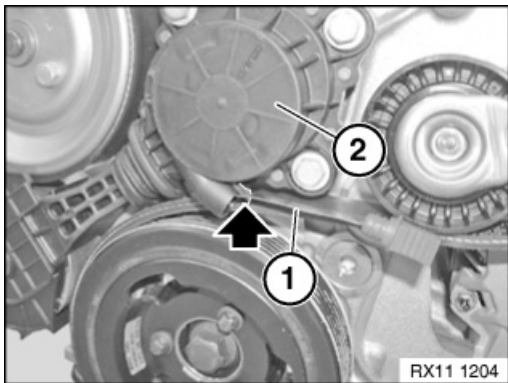




Move friction wheel (2) into service position.

In order to release the power transmission between crankshaft and coolant pump, it is necessary to move the friction gear (2) into the service position.

Pull handle (1) in direction of arrow until friction gear (2) is separated from belt pulley.



To secure friction gear in service position, suspend tensioning strap (1) on housing (2).

Remove drive belt from alternator.



Assemble engine. *Installation note:*

Check that drive belt for is in correct installation position - **risk of damage**.

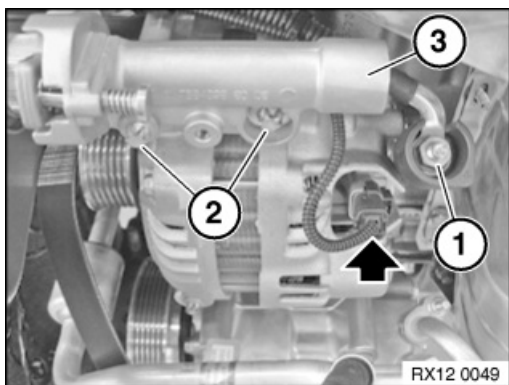


**Warning!**

Tensioning device is subject to spring bias (**danger of injury!**).

*Necessary preliminary tasks:*

- Remove right charge-air duct.
- Remove drive belt.



Unfasten screws (2).

Tightening torque: 11 28 1AZ.

Remove tensioning device (3).



Assemble engine.



**Special tools required:**

- 00 9 120
- 00 9 250
- 11 9 340
- 11 9 551
- 11 9 590
- 11 7 440
- 00 9 460

**Important!**

Modified procedure for timing setting.

The timing is not determined at firing TDC of cylinder no. 1.

All pistons are in the 90° position.

Check locking of adjusters.

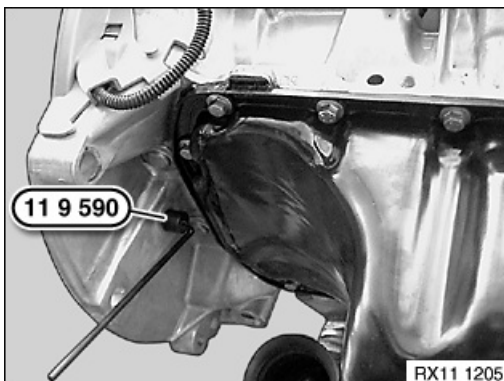
To open the central bolt on the camshaft, **do not** counter at the hexagon head on the camshaft.

Undo the central bolts using the special tool only.

Risk of damage!

*Necessary preliminary tasks:*

- Remove cylinder head cover.
- Check timing.

**Important!**

Danger of mixing up dowel hole.

Balance hole and dowel hole can be mixed up.

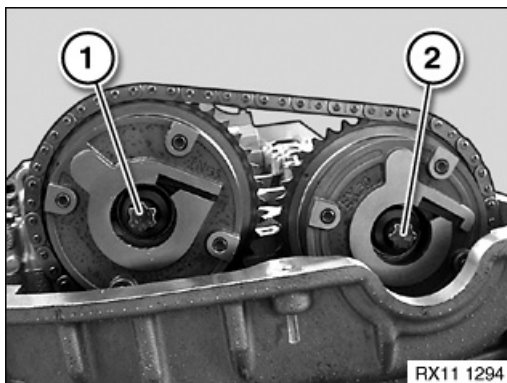
All pistons must be in the 90° position.

If necessary, determine by means of spark plug bore.

Rotate crankshaft at central bolt.

11 9 590 Slide in special tool in direction of arrow and block crankshaft.

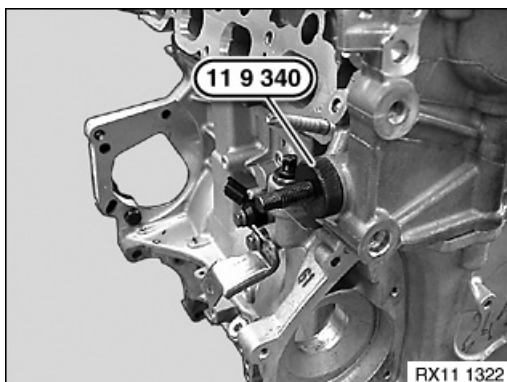




Important!

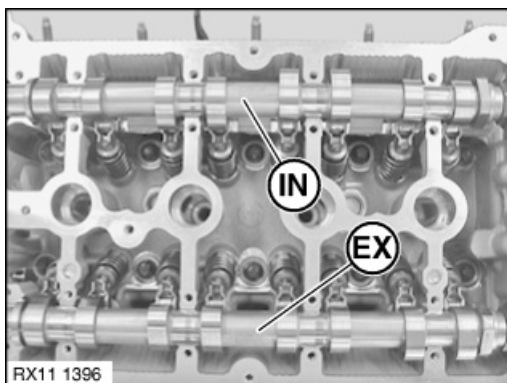
Risk of damage! at chain drive and special tool.

Both setting gauges 11 7 440 must be screwed to the cylinder head to open the central bolts (1 and 2).



If the setting gauges 11 7 440 cannot be fitted free of tension, then the special tool 11 9 340 must be released from the chain drive.

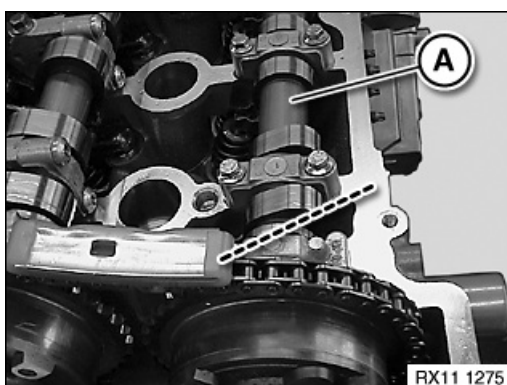
Loosen the spindle screw on special tool 11 9 340 until all tension in the entire chain drive has been released.



The designations for the intake camshaft (IN) and exhaust camshaft (EX) point upwards.

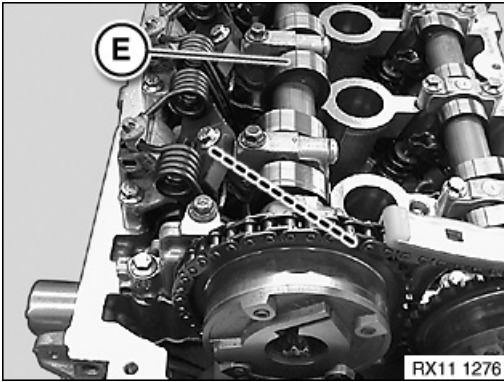
Both camshafts (inlet and exhaust) have three machined surfaces to enable special tool 11 7 440 to be mounted.

The fourth surface is not machined and has a half-moon form.

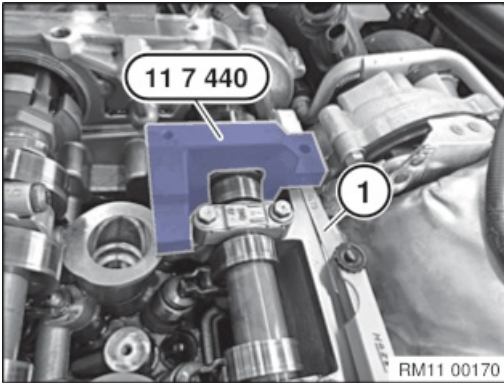


Position of exhaust camshaft (A) points at an angle to the right and up.

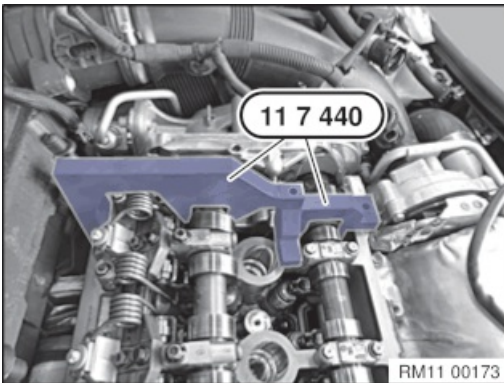




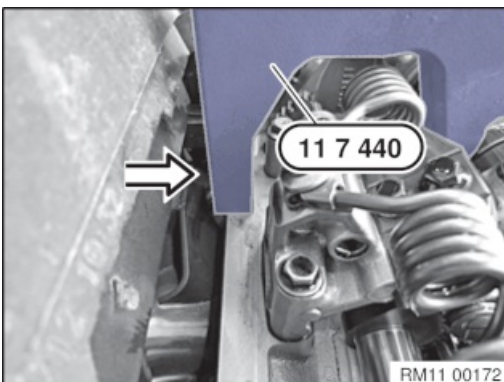
Position of intake camshaft (E) points at an angle to the left and up.



Turn exhaust camshaft at hexagon head in position.
Position special tool 11 7 440 on mounting flats of exhaust camshaft.

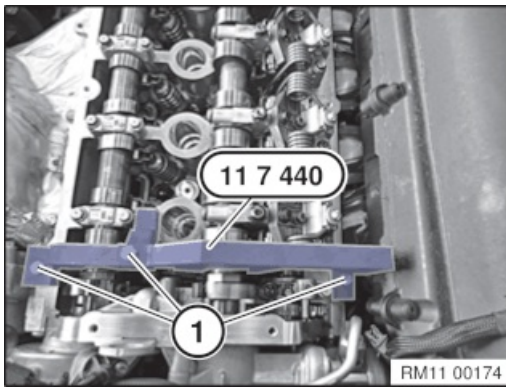


Turn intake camshaft at hexagon head in position.
Position both special tools 11 7 440 on the camshafts.

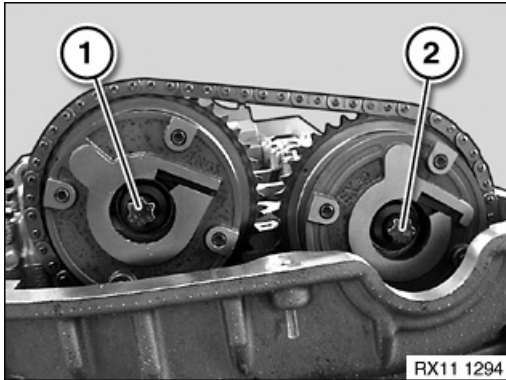


Special tool 11 7 440 must lie on the cylinder head with no gap between the tool and the head.



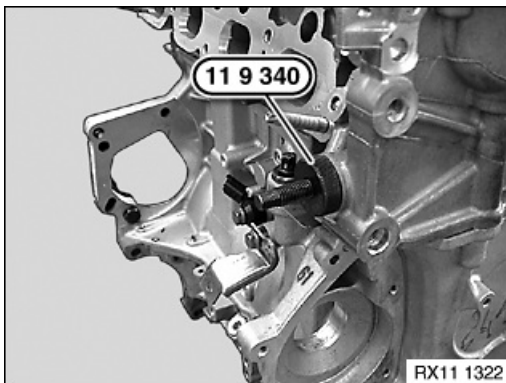


Secure special tool 11 7 440 with bolts (1) to cylinder head.



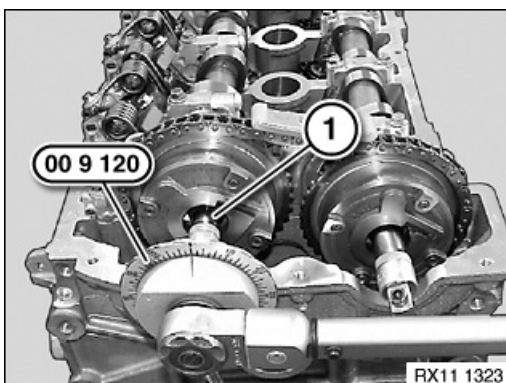
Release central bolts (1 and 2).

Tightening torque: 11 36 1AZ.



Screw special tool 11 9 340 back in.

Pre-tension timing chain with special tool 00 9 460 to **0.6 Nm**.



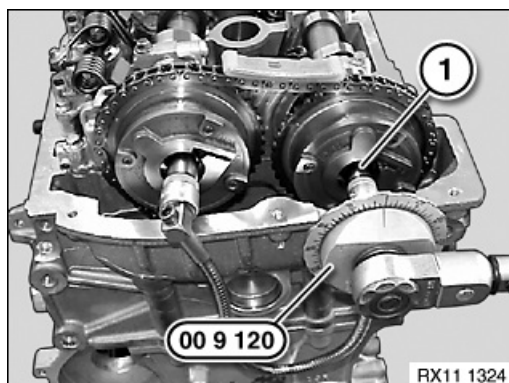
Installation note:

Slightly tension the intake camshaft at the hexagon head in direction of rotation with approx. 10-15 Nm.

Secure central bolt (1) with special tool 00 9 120 or an electronic torque wrench.

Tightening torque: 11 36 1AZ.





Installation note:

Slightly tension the exhaust camshaft at the hexagon head in direction of rotation with approx. 10-15 Nm.

Secure central bolt (1) with special tool 00 9 120 or an electronic torque wrench.

Tightening torque: 11 36 1AZ.



Remove all special tools.

Assemble engine.



**Special tools required:**

- 11 9 590
- 11 9 340
- 00 9 460
- 11 7 440

**Important!**

Modified procedure for timing.

The timing is not determined at firing TDC of cylinder no. 1.

All pistons are in the 90° position.

Check locking of adjuster.

Observe direction of rotation (direction of rotation clockwise when viewed towards timing drive side).

A reverse rotation of the engine is not permitted, test adjustment values will be distorted.

*Necessary preliminary tasks:*

- Remove cylinder head cover.

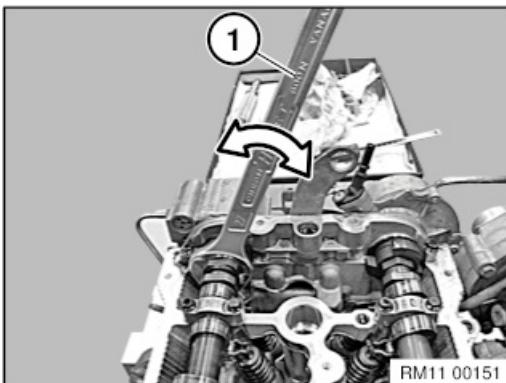
**Important!**

Check locking on VANOS unit.

Attempt to rotate camshaft in and counter to the direction of rotation at the hexagon head.

The adjustment unit is locked in the initial setting when the camshaft is non-positively connected to the adjustment unit.

The adjustment unit is faulty if **no** fixed connection to the camshaft is established



Check lock of VANOS unit.

Use an open-end spanner (1) to turn the intake camshaft counter to the direction of rotation.

Turn the exhaust camshaft in the direction of rotation.

Installation note:

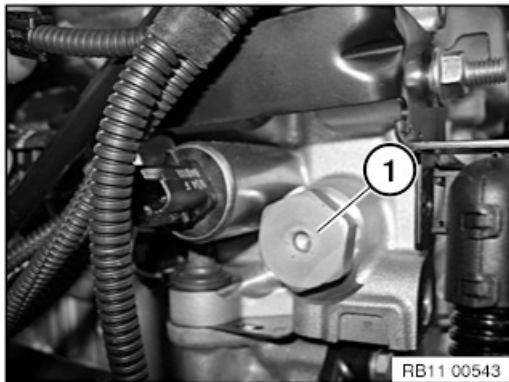
Maximum power 10 to 15 Nm.

If play of VANOS unit is below 1 degrees, the adjuster is OK.

If **no** fixed connection to the camshaft is established, the VANOS unit is faulty and must be replaced.

Graphic N14.





Partially release positive battery cable.

Release chain tensioner (1).

Tightening torque: 11 31 4AZ.

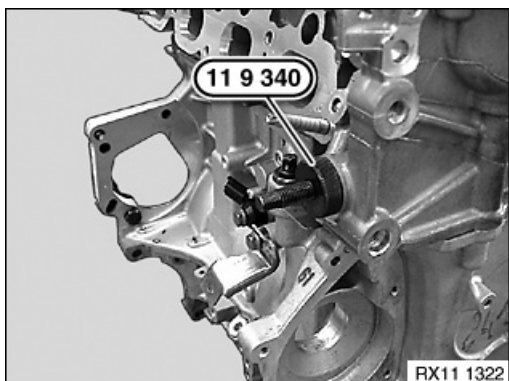
Important!

Have a cleaning cloth ready. A small quantity of engine oil will escape after the screw connection has been released.

Make sure no oil runs onto the belt drive.

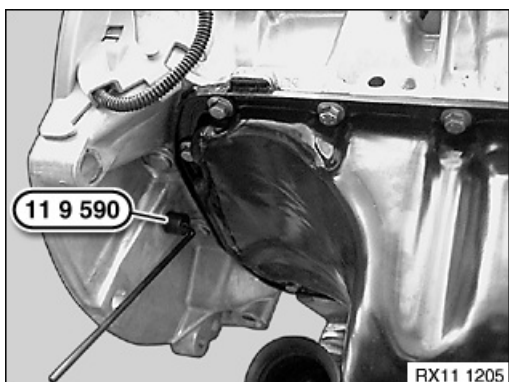
Installation note:

A new sealing ring must be installed by service personnel when the chain tensioner is fitted.



Screw special tool 11 9 340 into the cylinder head.

Pre-tension timing chain with special tool 00 9 460 to **0.6 Nm**.



Important!

Danger of mixing up dowel hole.

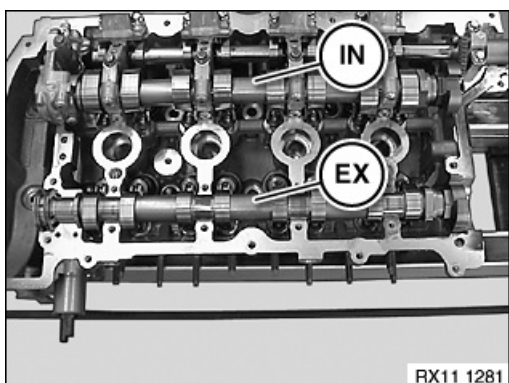
The balance hole and dowel hole can be mixed up; all pistons must be in the 90° position.

If necessary, determine by means of spark plug bore.

Rotate crankshaft at central bolt.

Position crankshaft with special tool 11 9 590 .

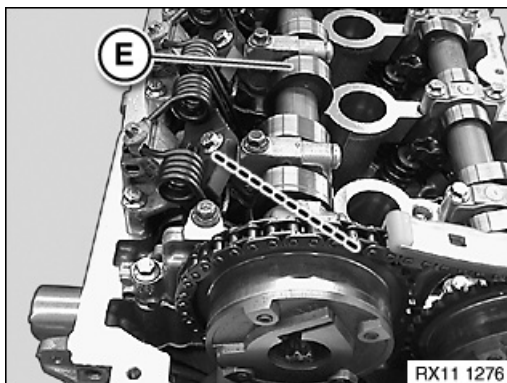
Do not remove special tool 11 9 590 during repair work.



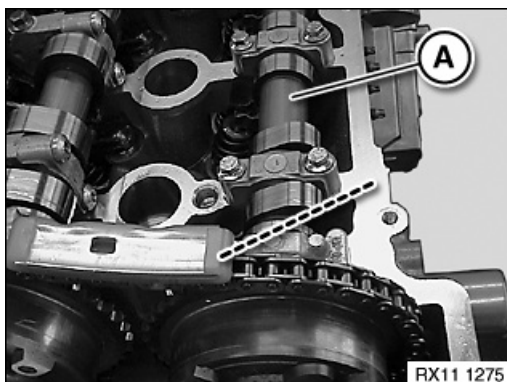
Both camshafts are in the correct installation position when the designation (IN) for intake camshaft points upwards.

In the case of the exhaust camshaft, the designation (EX) must point upwards.

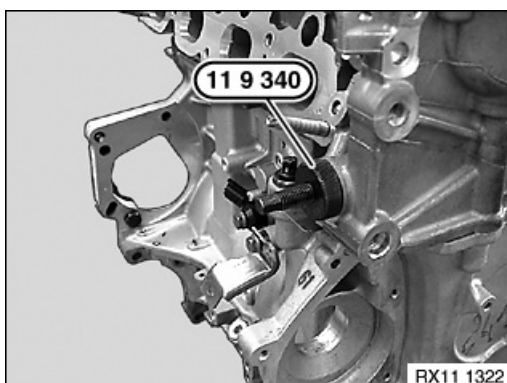




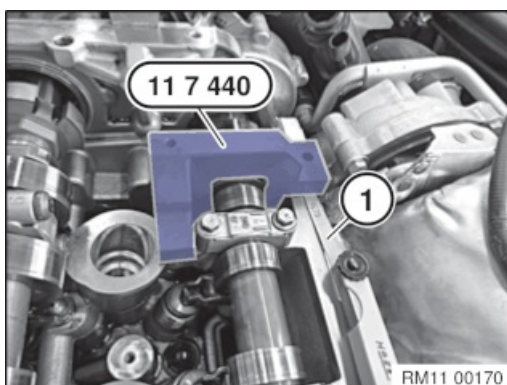
Position of inlet camshaft (E) points at an angle to the left in an upper outward direction.



Position of exhaust camshaft (A) points at an angle to the right in an upper outward direction



Use special tool 00 9 460 to tension timing chain to **0.6 Nm**.

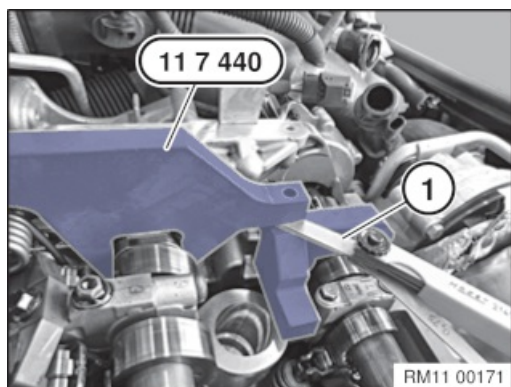


Place (position) special exhaust tool 11 7 440 on mounting flats of exhaust camshaft.

Determine air gap using a feeler gauge (1).

If the measured value on the exhaust camshaft is below 1.6 mm, the timing is OK.

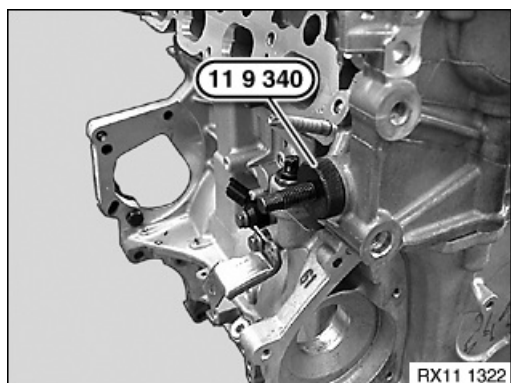




Place (position) special exhaust tool 11 7 440 on mounting flats of exhaust camshaft.

Determine air gap using a feeler gauge (1).

If the measured value on the exhaust camshaft is below 3.0 mm, the timing is OK.



Important!

Do not rotate engine without special tool 11 9 340 or a chain tensioner, the timing chain may skip on the gear of the intake camshaft.

Remove special tool 11 9 340 .



If necessary, adjust valve timing.



**Special tools required:**

- 2 353 281

**Attention!**

Measurement of timing chain is only possible during manual cranking (dynamic).

An engine start is **not** permissible.

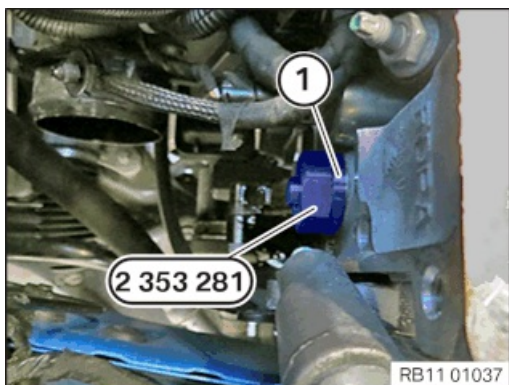
Cranking the engine is only permissible with special tool (chain tensioner).

Attention!

Do not turn engine against the direction of rotation.

**Necessary preliminary tasks:**

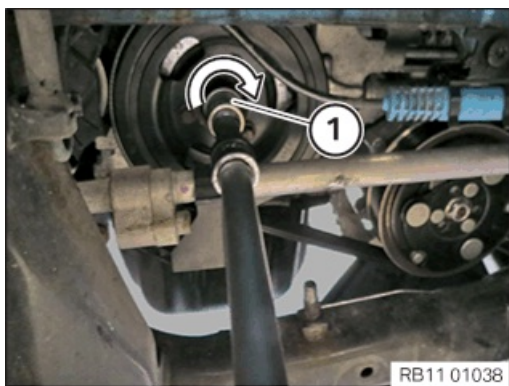
- Remove chain tensioner, remove sealing ring.
- Remove front wheel arch panel.

**Attention!**

Cranking the engine only with an installed special tool (chain tensioner) is permissible.

Screw in special tool 2 353 281 **without** shim (1).

Tightening torque. 11 31 4AZ.

**Attention!**

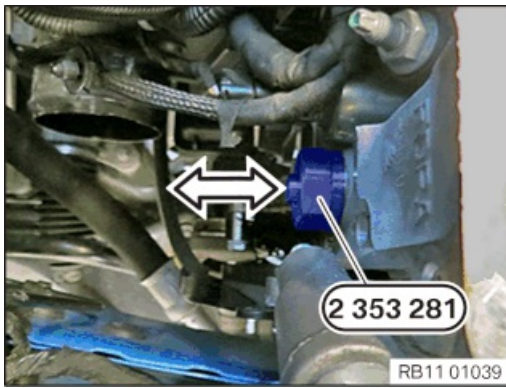
Do not turn the engine against the direction of travel.

Measurement of timing chain.

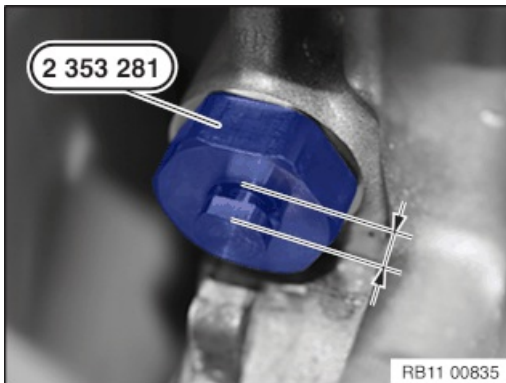
Crank engine at constant speed in direction of rotation **4 times**.

Determine minimum dimension on special tool 2 353 281 with the aid of a second person.





Depending on the tension and compression of the timing chain, the measuring pin is uniformly extended and retracted in direction of arrow on special tool 2 353 281 .

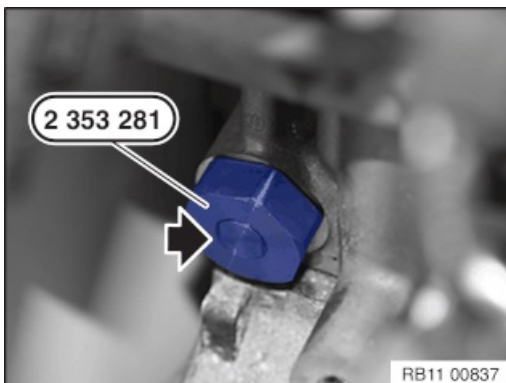


Determine protrusion or short length of the measuring pin on special tool 2 353 281 (see graphic).

Timing chain is OK if protrusion is detected on special tool 2 353 281 (measuring pin).



Assemble engine.



If a short length or flush distance is detected on special tool 2 353 281 (measuring pin), the timing chain and chain tensioner must be renewed.



Installation note:
Replace timing chain.

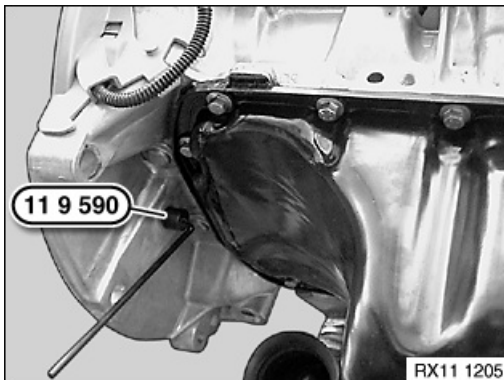


**Special tools required:**

- 11 9 590

**Necessary preliminary tasks:**

Remove wheel arch shell at front right.

**Important!**

Risk of chain jumping.

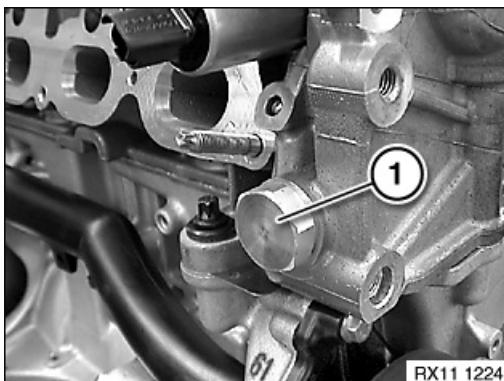
Position engine in 90° position with special tool 11 9 590 .

Balance hole and dowel hole can be mixed up.

If necessary, determine by means of spark plug bore.

Rotate crankshaft at central bolt.

Position crankshaft with special tool 11 9 590 .



Release chain tensioner (1).

Tightening torque: 11 31 4AZ.

Important!

Have a cleaning cloth ready. A small quantity of engine oil will emerge after the screw connection has been released.

Make sure no oil runs onto the belt drive.

Installation note:

A new sealing ring must be installed by service personnel when the chain tensioner is fitted.



Remove all special tools.

Assemble engine.



**Special tools required:**

- 11 4 480
- 11 9 000
- 11 9 551
- 11 9 552
- 11 9 661
- 11 9 662
- 11 7 440

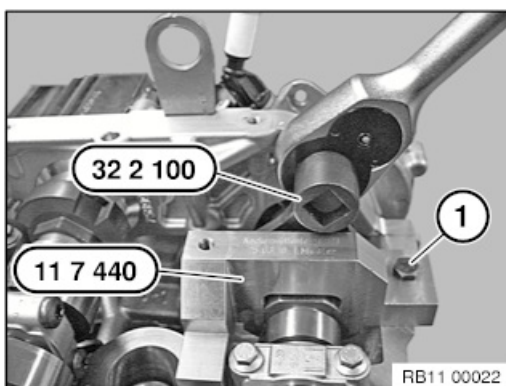
**Important!**

It is absolutely essential to follow an exact procedure for dismantling and installing the intake camshaft.

In order to avoid incorrect timing setting, it is essential to check the locking of the camshaft adjuster and if necessary perform locking by rotating the camshaft.

**Necessary preliminary work:**

- Remove cylinder head cover.
- Check timing.
- Remove chain tensioner.
- Remove intermediate lever.

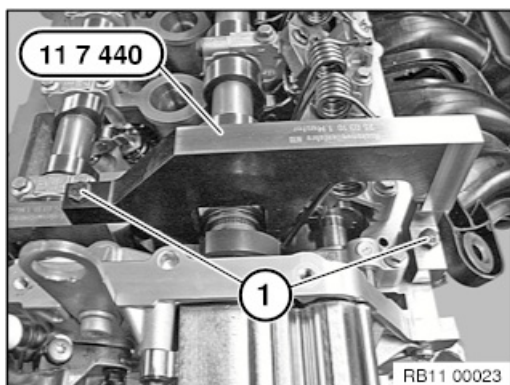
**Important!**

Check function of camshaft adjuster locking by rotating camshaft.

To release central bolts, always use special tool 11 7 440 of exhaust camshaft.

Position the special tool 11 7 440 at the mounting flats of the exhaust camshaft and fasten it with a screw (1).



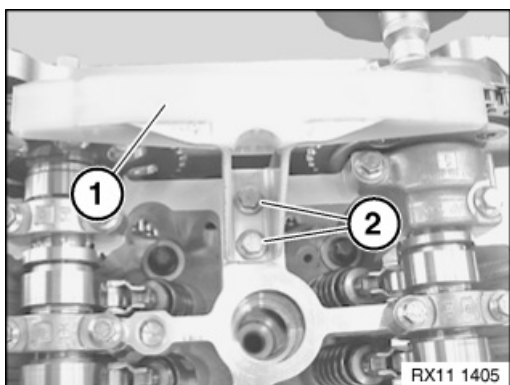


Important!

Check function of camshaft adjuster locking by rotating camshaft.

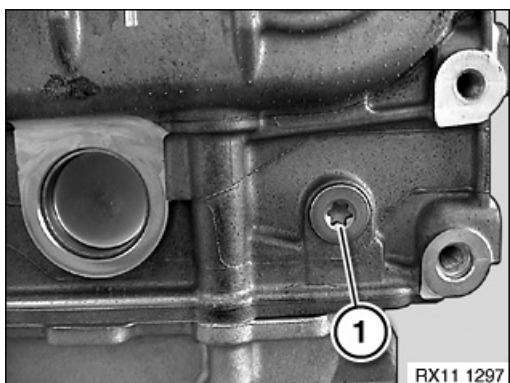
Position the special tool 11 7 440 on the intake and exhaust camshaft and fasten it with screws (1).

To release central bolts, always use special tool 11 7 440 .



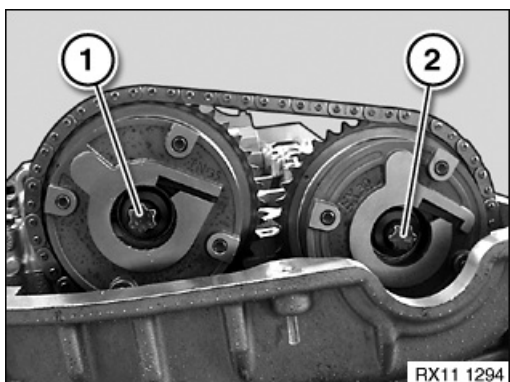
Unfasten screws (2).

Remove tensioning rail (1).



Release screw (1).

Tightening torque: 11 11 3AZ.



Release central bolt (1).

Tightening torque: 11 36 1AZ.

Place the VANOS unit onto the special tool 11 4 480 .

Remove exhaust camshaft.

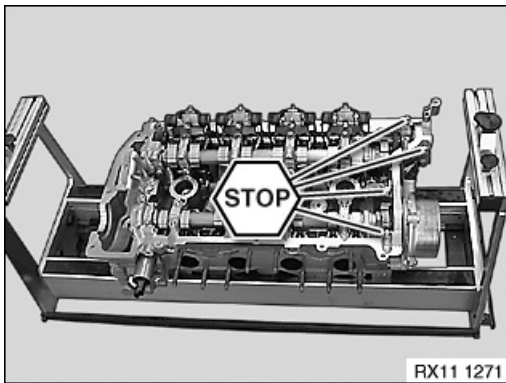


Important!

Removed cylinder head:

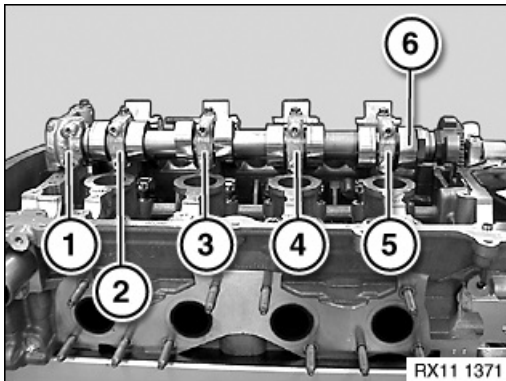
When using special tool 11 9 000 , it will be necessary to remove the aluminum strip.





Important!

The screw connection of the bearing bracket may not be loosened; **Risk of damage!**

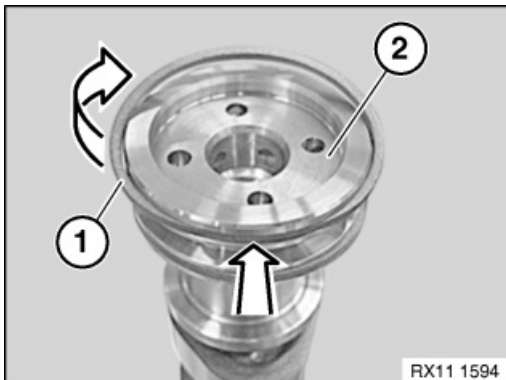


Release all screws on the bearing cap (1 to 5).

Tightening torque: 11 12 7AZ.

All bearing caps (1 to 5) are identified with numbers from (6 to 9).

Set down all intake camshafts (6) on the special tool 11 4 480 in neat order.



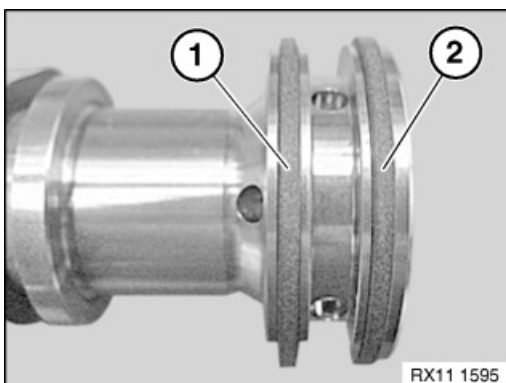
Plastic plain rectangular compression ring:

Plastic plain rectangular compression rings are already pre-installed on a new camshaft.

Plastic plain rectangular compression rings (1) are maintenance-free and must be replaced if damaged.

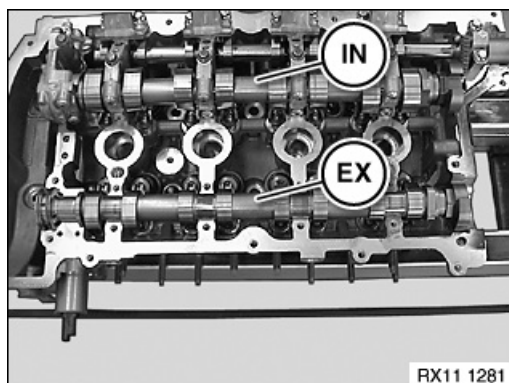
Insert plastic plain rectangular compression ring (1) into groove of intake camshaft (2) (see arrow).

Lightly oil plastic plain rectangular compression ring (1) and rotate in direction of arrow until plastic plain rectangular compression ring (1) is positioned on the intake camshaft.



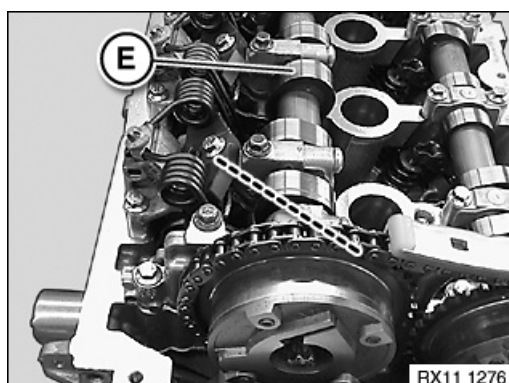
Check plastic plain rectangular compression ring (1 and 2) for freedom of movement.





Intake camshaft is identified with identification (IN).

Insert the intake camshaft so that the designation (IN) can be read from above.



Position the intake camshaft (E) so that cam of intake camshaft () points upward at an angle. *Installation note:*

Lubricate all bearing positions with engine oil.



Assemble engine. *Installation note:*

Adjust valve timing.



**Special tools required:**

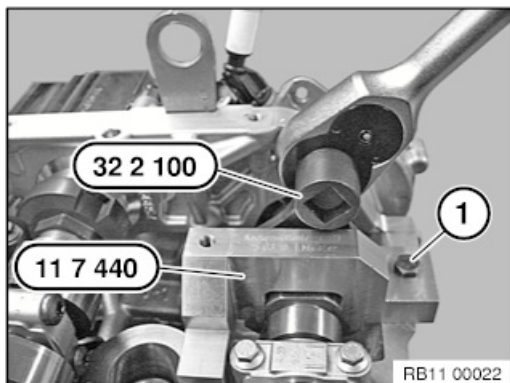
- 11 9 000
- 11 9 551
- 11 9 552
- 32 2 100
- 11 7 440
- 11 9 652
- 11 9 650

**Attention!**

It is absolutely essential to follow an exact procedure for dismantling and installing the exhaust camshaft.

*Necessary preliminary tasks:*

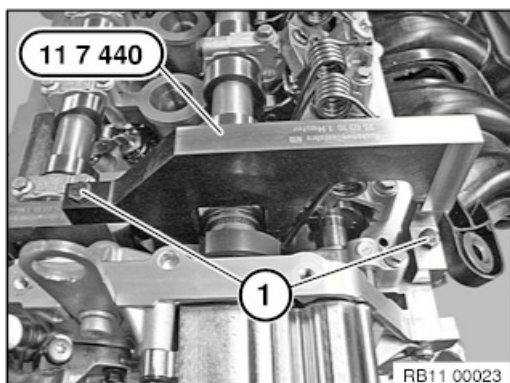
- Remove cylinder head cover.
- Check timing.
- Remove chain tensioner.

**Attention!**

Use special tool 32 2 100 to check the function of the adjusting unit by rotating the camshaft.

To release central bolts, always use special tool 11 7 440 of exhaust camshaft.

Position the special tool 11 7 440 at the mounting flats of the exhaust camshaft and fasten it with a screw (1).

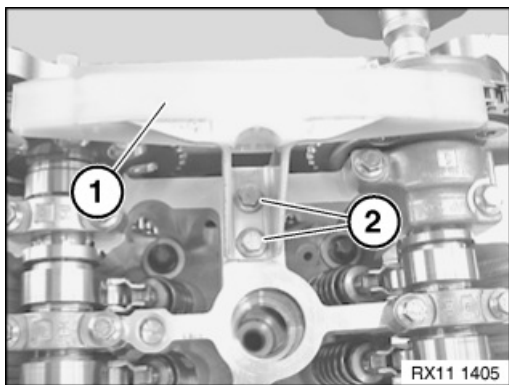
**Attention!**

Use special tool 11 7 440 to check the function of the adjusting unit by rotating the camshaft.

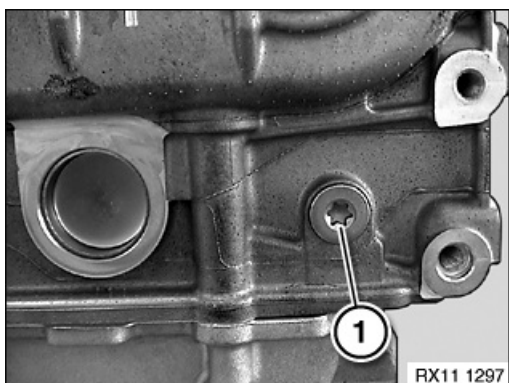
Position special tool 11 7 440 on intake and exhaust camshafts.

Secure special tool 11 7 440 on the cylinder head with screws (1).

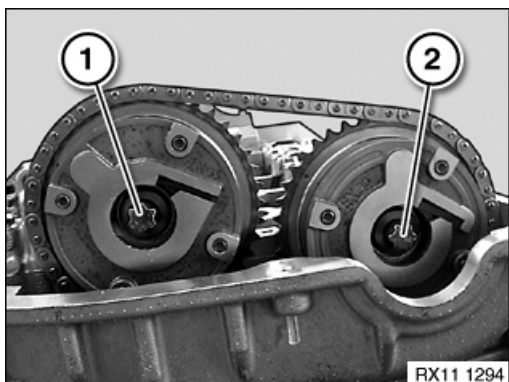




Unfasten screws (2).
Remove tensioning rail (1).



Release screw (1).
Tightening torque: 11 11 3AZ.

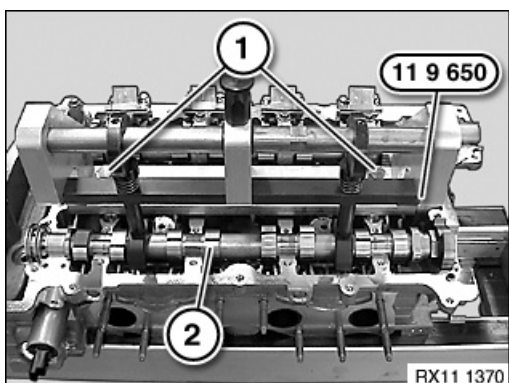


Release central bolt (2).
Tightening torque: 11 36 1AZ.
Guide the VANOS unit in front of the timing chain toward the front.



Attention!

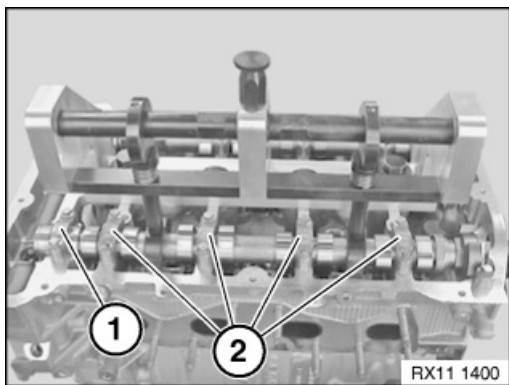
Removed cylinder head:
When using special tool 11 9 000 , it will be necessary to remove the aluminum strip.



Attention!

Risk of damage to spark plug bores.
Check special tool (1 screws 11 9 652) for damage.
Secure special tool 11 9 650 on cylinder head with special tool (1 screws 11 9 652) in spark plug holes.



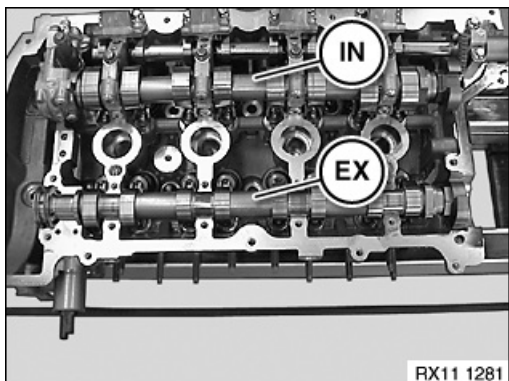


Release all screws on bearing caps (1 and 2).

Tightening torque: 11 12 8AZ.

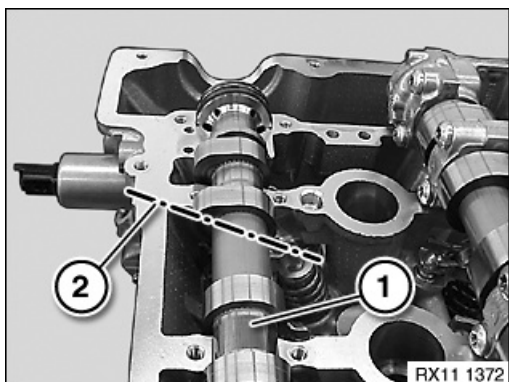
Bearing cap (1) is a thrust bearing and has the number (0).

All bearing caps (2) are identified with numbers from (1 to 4).



Exhaust camshaft is identified with identification (EX).

Insert the exhaust camshaft so that the designation (EX) can be read from above.



Position exhaust camshaft (1) so that cam of exhaust camshaft (2) points outward at an angle.

Installation note:
Lubricate all bearing positions with engine oil.



Assemble engine. *Installation note:*
Adjust valve timing.



11 31 051 Replacing timing chain (N18)



Special tools required:

- 00 9 120
- 11 9 280
- 11 9 550
- 11 9 590
- 11 9 630
- 11 7 440



Important!

Modified procedure for timing adjustment.

The timing is not determined at firing TDC of cylinder no. 1.

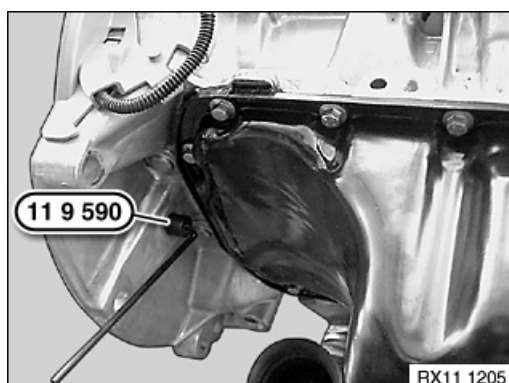
All pistons are in the 90° position.

Observe direction of rotation (direction of rotation always clockwise when viewed towards timing drive side).



Necessary preliminary tasks:

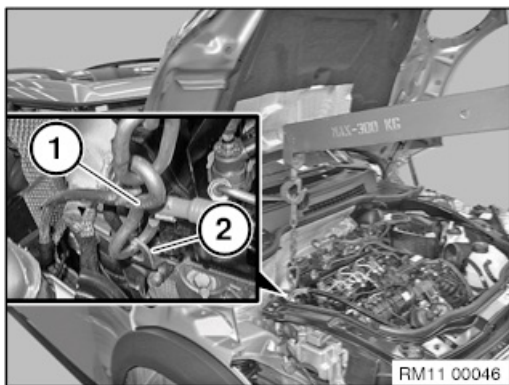
- Remove cylinder head cover.
- Remove all spark plugs.
- Remove vibration damper.
- Remove chain tensioner.
- Remove VANOS unit.
- Remove PTFE ring at front.
- Remove belt tensioner.
- Remove friction gear.



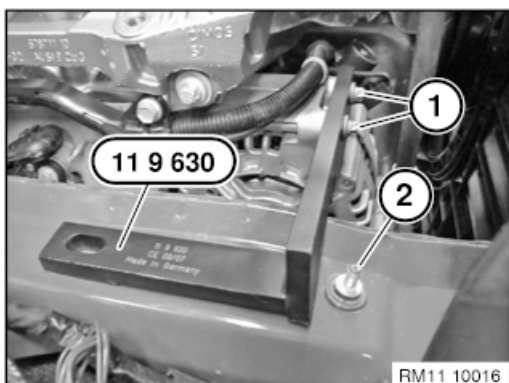
Crankshaft is positioned with special tool 11 9 590 .

Do not remove special tool 11 9 590 during repair work.

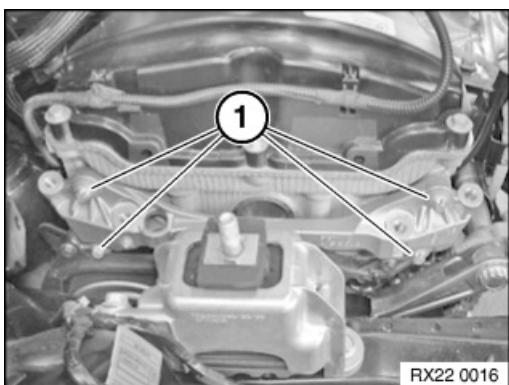




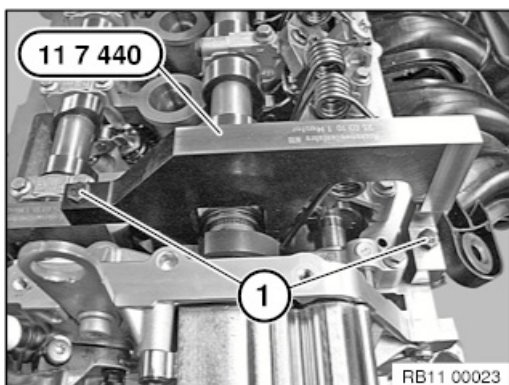
Attach the engine lifter (1) to the engine mounting bracket (2).
Slightly raise the engine with the engine lifter.



Release upper alternator screws (1). Do not remove alternator.
Secure special tool 11 9 630 with standard bolts (1).
Lower the engine lifter and make sure that the ground support point (2) is not damaged.
Place the special tool 11 9 630 onto the side member.

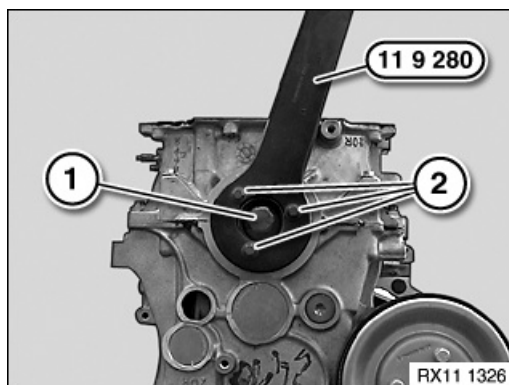


Remove adapter plate.
Remove right engine mount.



Do not remove special tool 11 7 440 .

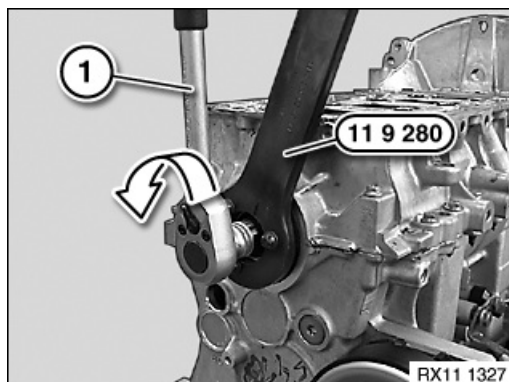




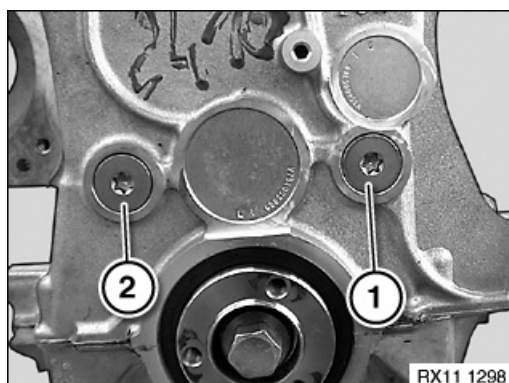
Important!

Employ a **second** person for gripping when releasing central bolt (1).

Fit special tool 11 9 280 on hub for vibration absorber with screws (2).
Release central bolt (1).

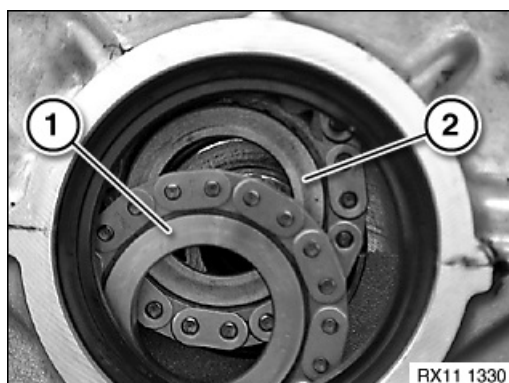


Release central bolt in direction of arrow.



Release bearing journal (1 and 2).

Tightening torque: 11 31 1AZ.



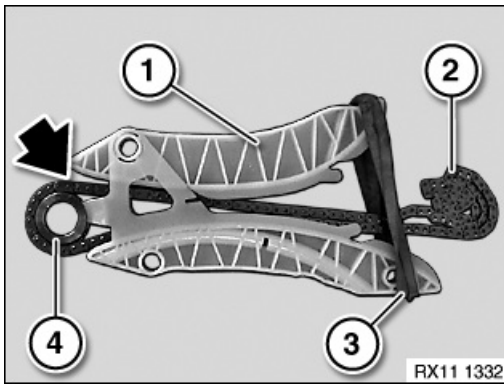
Important!

The camshaft sprocket (2) must remain positioned on journal of crankshaft.

Sprocket (1) of timing chain.

Sprocket (2) of oil pump.





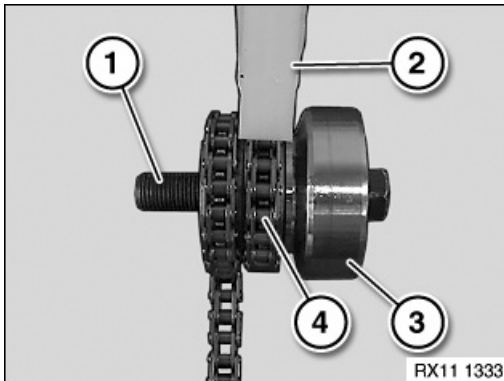
Secure chain module (1) with rubber part (3) to facilitate assembly.

Pull timing chain (2) upwards until sprocket (4) rests against chain guide (1).

Install timing chain (2) and sprocket (4) in this position.

Installation note:

Always keep timing chain (2) tensioned; it is possible for timing chain (2) to jam on chain module (1).



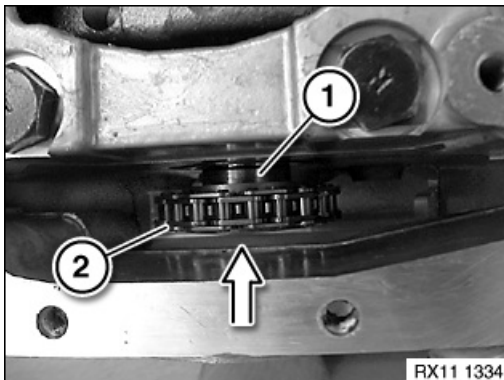
Installation position of both sprockets.

Sprocket (1) of oil pump.

Guide rail (2) of timing chain.

Hub (3) on crankshaft.

Sprocket (4) of timing chain.

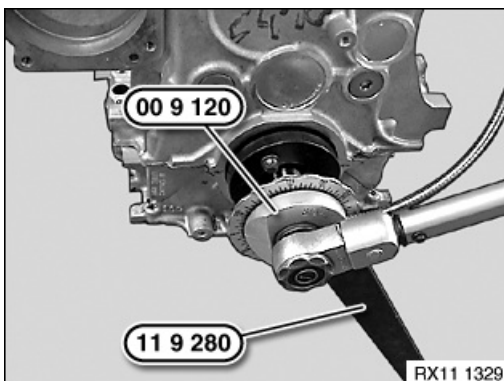


Check oil pump sprocket (2) is in correct installation position.

Insert chain module with timing chain and secure.

Attach crankshaft hub.

Screw in central bolt.



Remove special tool 11 9 280 from hub.

Secure central bolt with special tool 00 9 120 .

Tightening torque: 11 21 1AZ.



Install VANOS unit.

Crank engine twice.

Check timing.

Install PTFE ring.

Assemble engine.





11 31 549 Unriveting and renewing timing chain using special tool (N12N16N18)



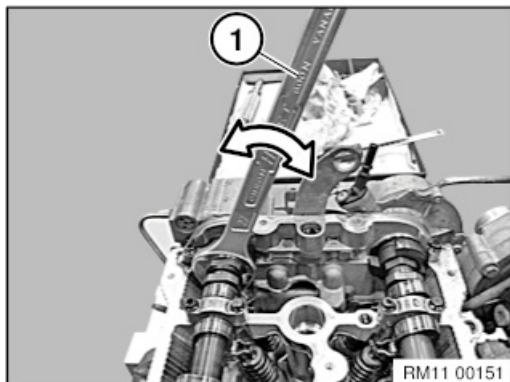
Special tools required:

- 11 9 590
- 11 7 440
- 11 9 540
- 2 353 281
- 2 354 984
- 2 354 983
- 11 4 480
- 2 354 976
- 2 354 962



Necessary preliminary work:

- Remove cylinder head cover.
- Check timing chain for elongation.
- Remove right engine mounting bracket.



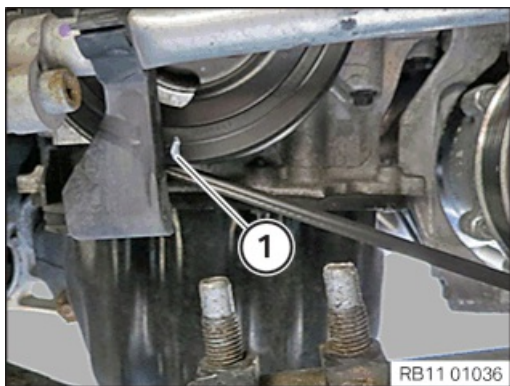
Check lock of VANOS unit.

Use an open-end spanner (1) to twist intake camshaft in direction of arrow.

Installation note:

Maximum power 10 to 15 Nm.

If play of VANOS unit is less than 10 degrees, intake adjuster is OK.



Caution!

Danger of mixing up dowel hole.

Balance hole and special tool dowel hole can be mixed up; all pistons must be in the 90° position.

If necessary, determine by means of spark plug bore.

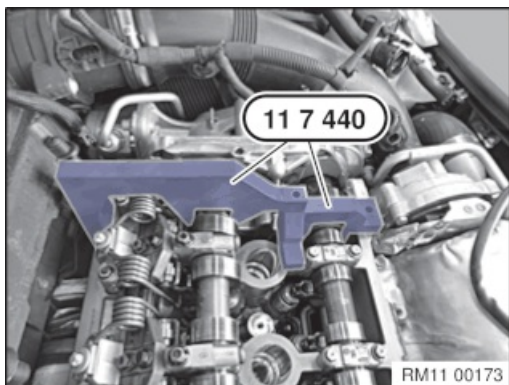
Rotate crankshaft at central bolt.

11 9 590 Slide in special tool in direction of arrow and block crankshaft.

Apply colour coding (1) to vibration absorber.

A reverse rotation of the engine is not permitted, test adjustment values will be distorted.





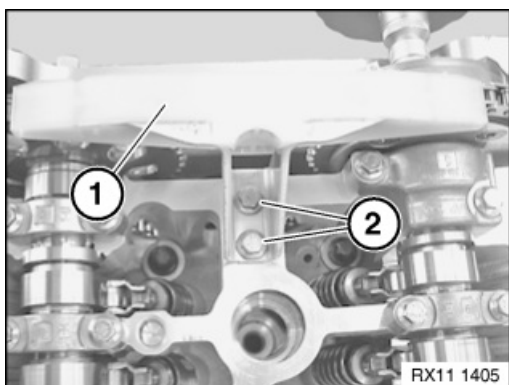
Caution!

Risk of damage! To chain drive.

To open central bolt, mount special tool on camshaft.

If the setting gauges cannot be positioned, grip the camshaft with an open-end wrench to release the central bolt.

Graphic N18.



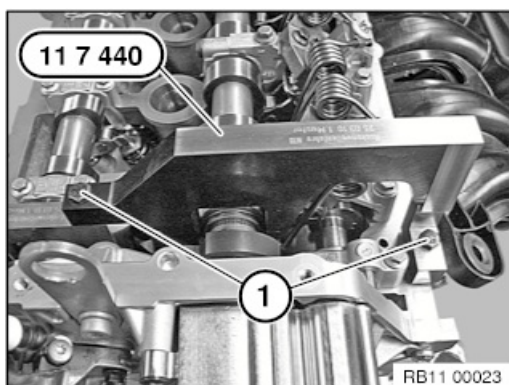
Unfasten screws (2).

Remove upper slide rail (1).

Caution!

Check upper slide rail (1) for damage, e.g. cracks or pittings.

If there are cracks or pittings, the entire control drive must be renewed.

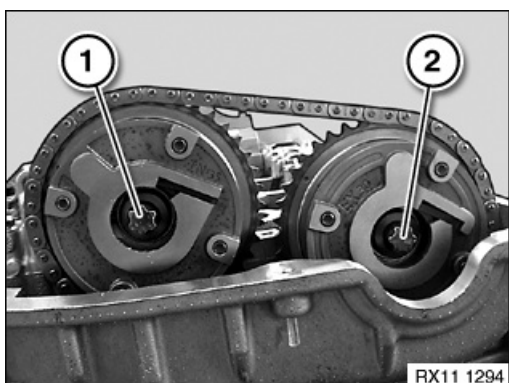


N18t:

Fit special tool 11 7 440 on the out- and intake camshaft.

N12, N16:

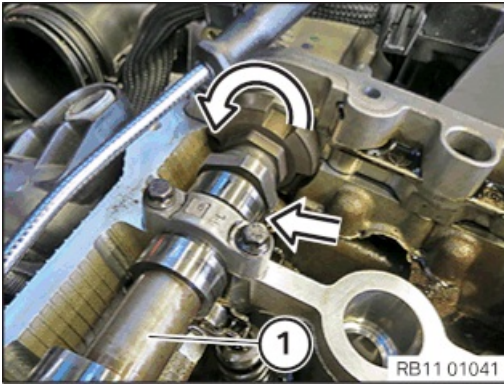
Fit special tool 11 9 540 on the out- and intake camshaft.



Release central bolts (1 and 2) by 90°.

Do not remove camshaft sprocket (2), timing chain (1) must still be in equipment installation status to be riveted on.



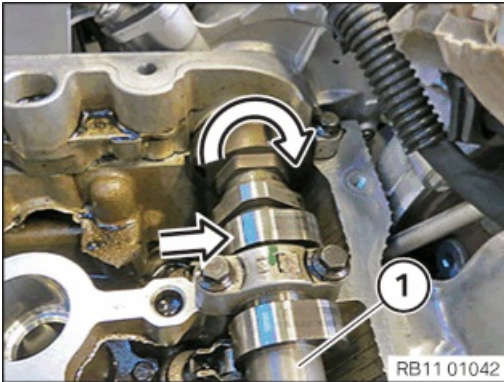


Remove the special tools.

Twist intake camshaft (1) in direction of arrow until camshaft is blocked by valve springs.

Note:

Intake camshaft is in a non-critical position, all intake valves are closed.

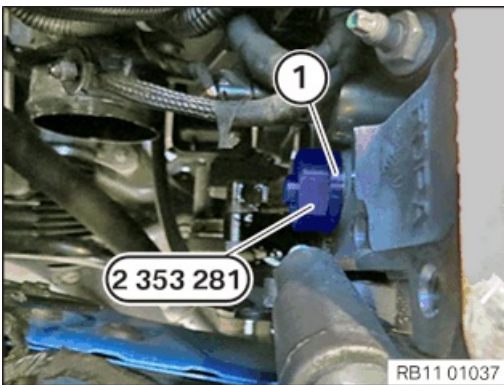


Remove the special tools.

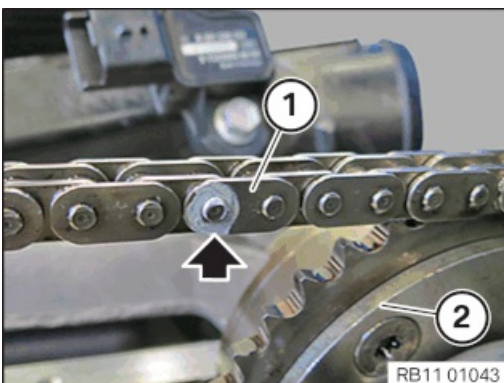
Twist exhaust camshaft (1) in direction of arrow until exhaust camshaft is blocked by valve springs.

Note:

Exhaust camshaft is in a non-critical position, all exhaust valves are closed.



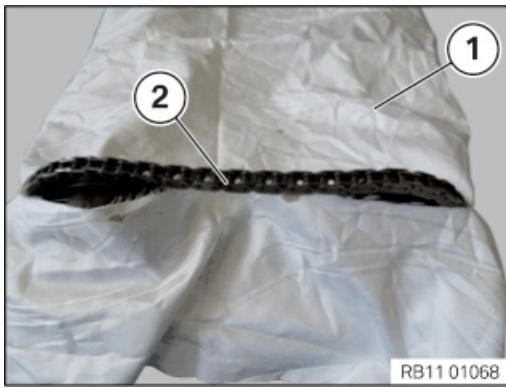
Remove special tool 2 353 281 with shim (1).



Cover cylinder head at chain drive with a suitable cleaning cloth.

Mark left rivet at cover tab (1) (see arrow).





Cut lint-free cloth (1) with a cutting knife to the length of timing chain (2).
See illustration.



Opening the timing chain:

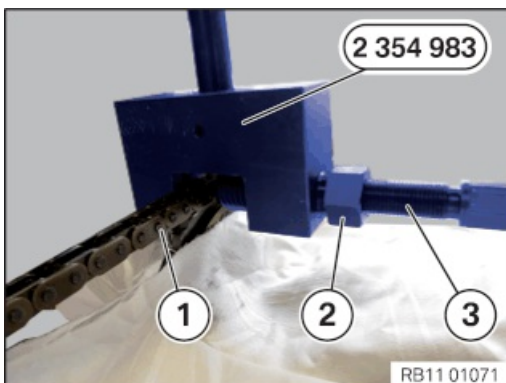
Turn back pressing-off bolt (1) on special tool 2 354 984 .



Installation note:

Bore hole (centring aid)

Turn back pressing-off bolt on special tool 2 354 984 up to short length (see arrow).



Caution!

Loose rivet can fall in the engine compartment.

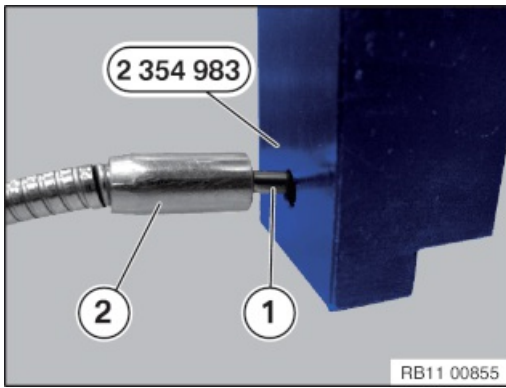
Close bore hole at special tool 2 354 983 with suitable auxiliary materials such as adhesive tape.

Position special tool 2 354 983 on timing chain (rivet) (centring).

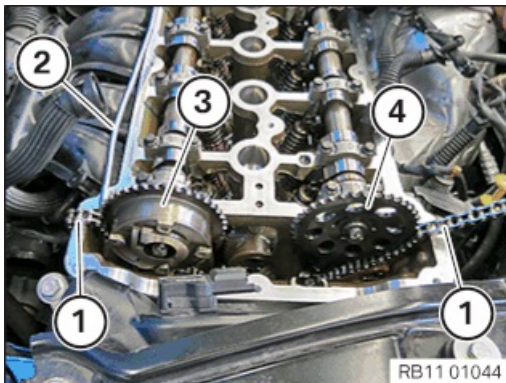
Pretension spindle (2) up to bolt/limit position of timing chain by hand.

Press off rivet with pressing-off bolt (3), screw in special tool up to limit position.

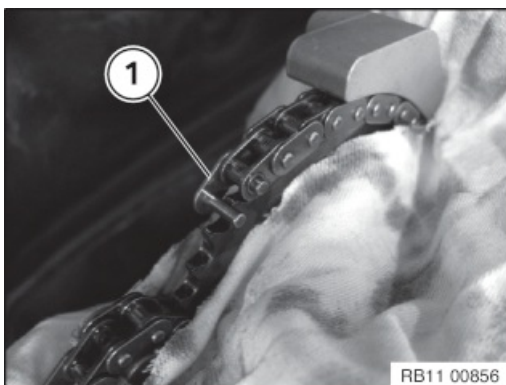




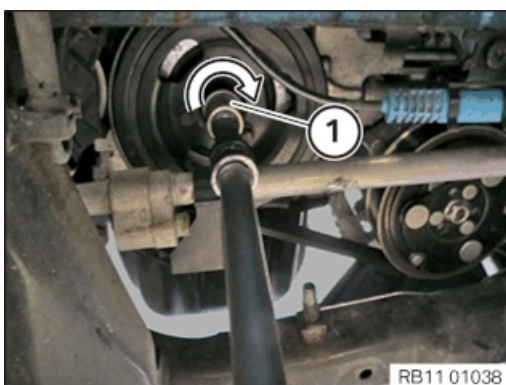
Remove rivet (1) from special tool 2 354 983 with a magnet (2).
Remove special tool 2 354 983 .



Secure open timing chain (1) with a magnet (2).
Remove intake camshaft (3) and set down in neat order on special tool 11 4 480 .
Remove exhaust sprocket wheel (4) and set down in neat order on special tool 11 4 480 .
Graphic N14.

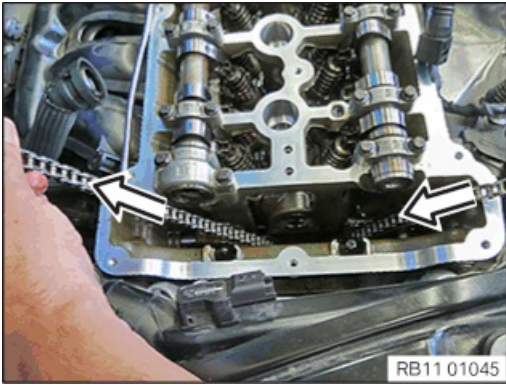


Tightening the timing chain:
Attach link (1) in open timing chain.
Attach new timing chain to link.
Illustration: N47.

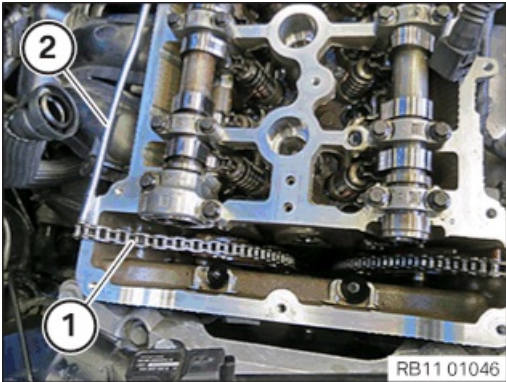


Slowly crank engine at central bolt (1) in direction of engine rotation.

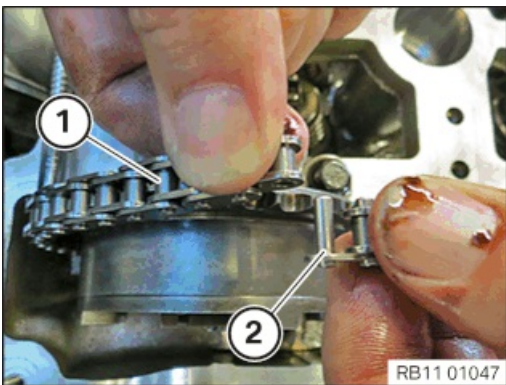




Pull in timing chain in direction of arrow with the assistance of a second person.



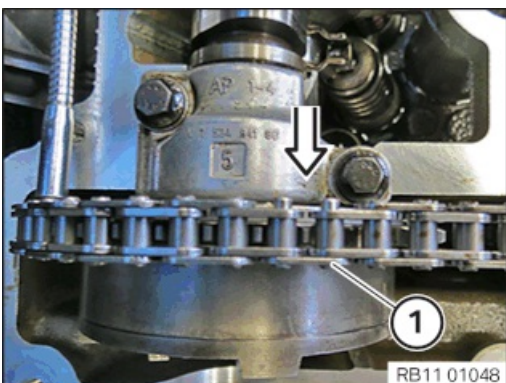
Secure new timing chain (1) with a magnet (2).



Install VANOS intake gear.

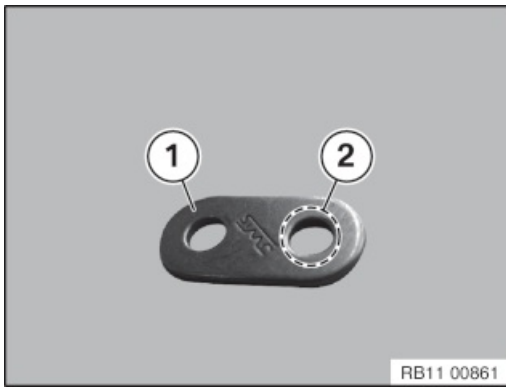
Install exhaust sprocket wheel.

Connect timing chain (1) to a new link (2).



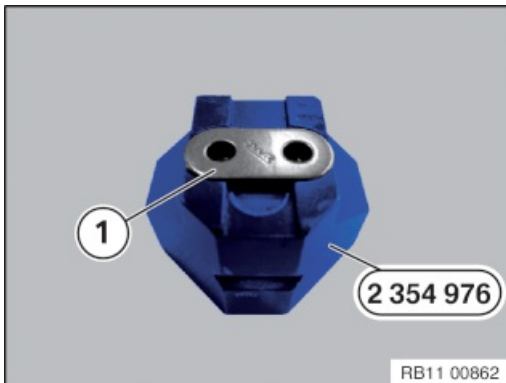
Slide in link (1) until it is flush (see arrow).





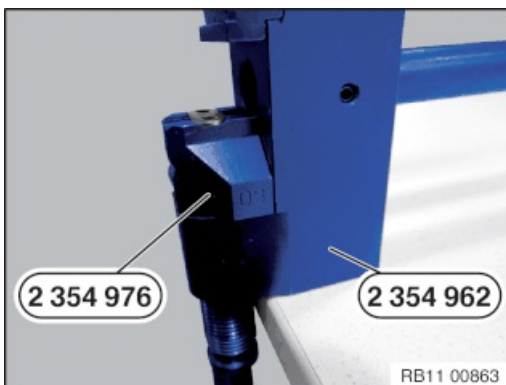
Installation note:

Rounded sides (2) of connecting lug (1) must point towards timing chain.



Prepare special tool 2 354 976 with cover tab (1) with the rounded side (see graphic).

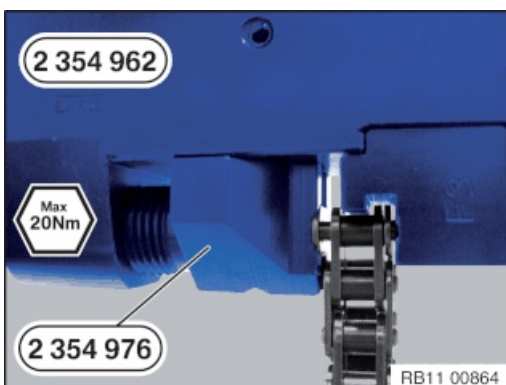
Fasten cover tab (1) on magnets of special tool 2 354 976 .



Caution!

Loose components

Slide on special tool 2 354 976 with cover tab onto mounting bolts of special tool 2 354 962 .



Caution!

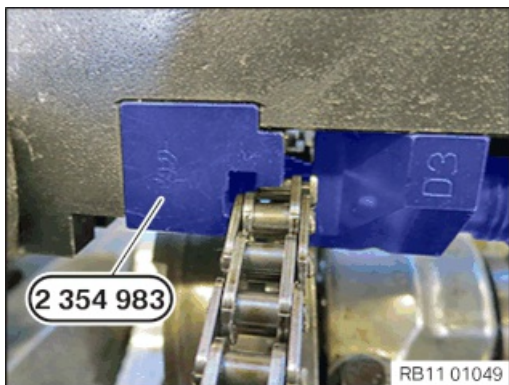
Maximum 20 Nm

Do not increase torque, risk of damage to link.

Manually join cover tab on chain lock to spindle on special tool 2 354 976 .

Make sure chain locks and special tool 2 354 976 are positioned exactly
Risk of damage!



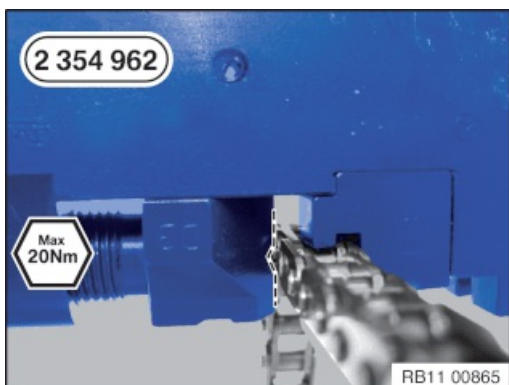


Caution!

Maximum 20 Nm

Do not increase torque, risk of damage on chain lock.

Press on cover tabs with 20 Nm.



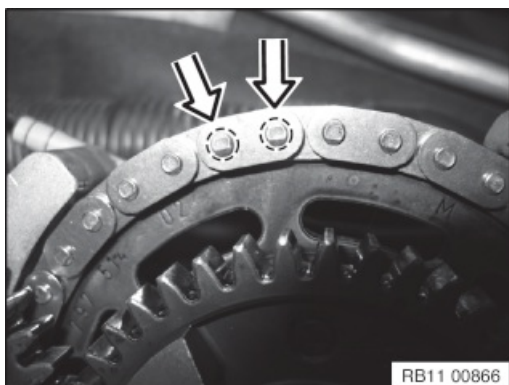
Caution!

Do not exceed maximum **20 Nm** torque on chain lock not **risk of damage!**

For safety purposes, the link must be pressed in again.

Remount special tool 2 354 976 on special tool 2 354 962 (see graphic).

Press in both rivets singly on chain lock with special tool 2 354 976 to maximum **20 Nm**.



Check both rivets (see graphic).

Graphic N47.



Installation note:

Assemble engine.

Renew chain tensioner and upper slide rail.



**Special tools required:**

- 11 4 480

**Important!**

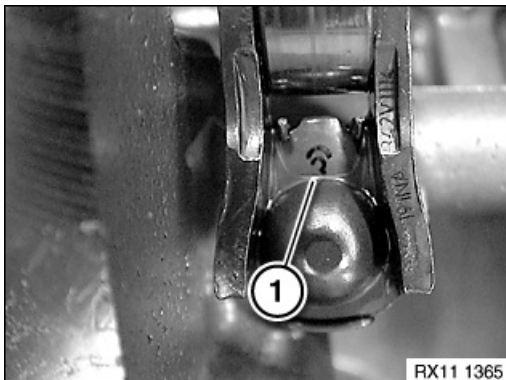
Rocker arms (1) are divided into bearing categories.

The tolerance classes are identified in numbers from 1 to 6.

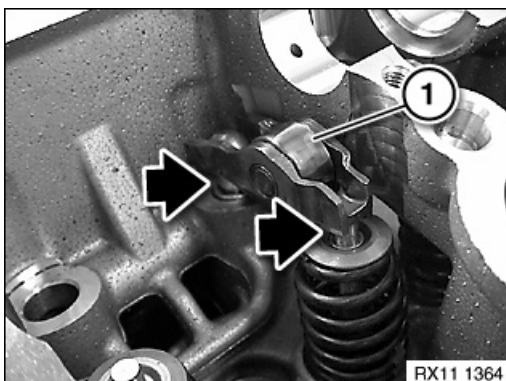
Already used roller cam followers (1) may only be reused in the same position.

*Necessary preliminary work:*

- Remove cylinder head cover.
- Remove intermediate lever.
- Remove exhaust camshaft.

**Important!**

Already used roller cam followers (1) may only be reused in the same position.



Separate roller cam followers (1) from hydraulic valve clearance compensating element and remove.

Place roller cam followers (1) in neat order on special tool 11 4 480 .

Installation note:

Before installing camshafts, make sure roller cam followers are correctly seated (see arrow).



Assemble engine.

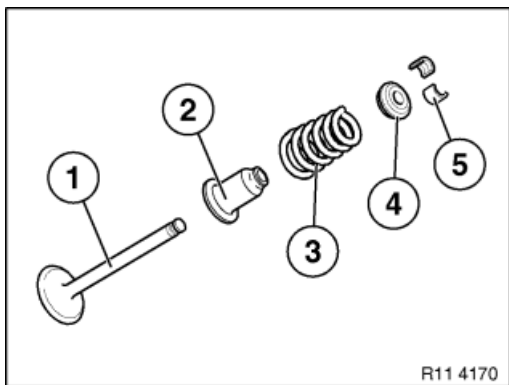


**Special tools required:**

- 11 4 480

*Necessary preliminary tasks:*

- Remove cylinder head.
- Remove exhaust camshaft.
- Remove intake camshaft.
- Remove roller cam follower.
- Remove valve springs.
- Remove valve stem seals.

**Arrangement:**

- 1) Valve
- 2) Valve stem seal with spring cup, bottom
- 3) Valve spring
- 4) Top spring cup
- 5) Valve keys

If the valves are to be reused, set them down in special tool 11 4 480 in a tidy and orderly fashion.



Assemble engine.

Check function of DME.



11 34 715 Replacing all valve springs (N18)



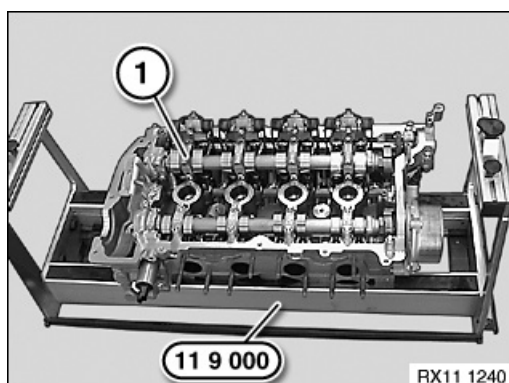
Special tools required:

- 11 4 480
- 11 9 000
- 11 9 006
- 11 9 007
- 11 9 017
- 11 9 001

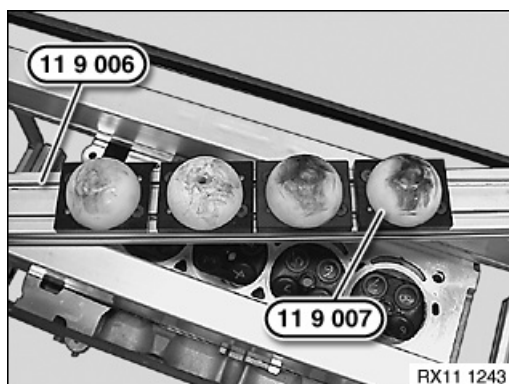


Necessary preliminary tasks:

- Remove cylinder head cover.
- Remove cylinder head.
- Remove exhaust camshaft.
- Remove intake camshaft.
- Remove roller cam follower.

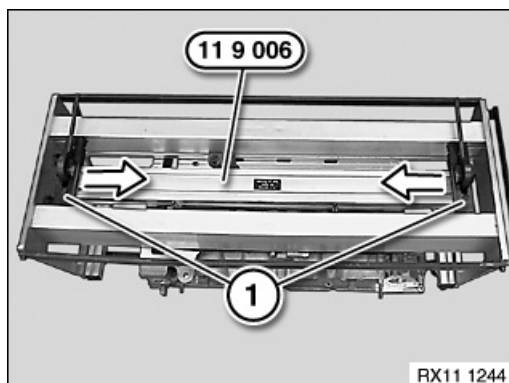


Mount cylinder head (1) on special tool 11 9 000 .



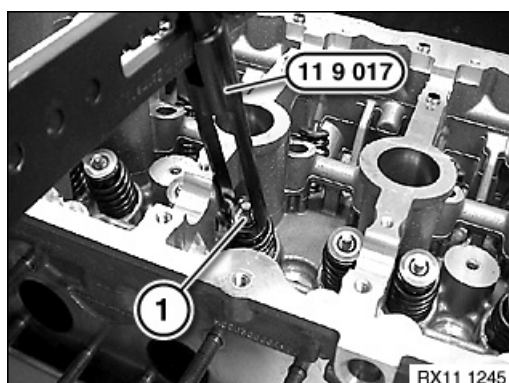
Prepare special tool 11 9 007 on special tool 11 9 006 .



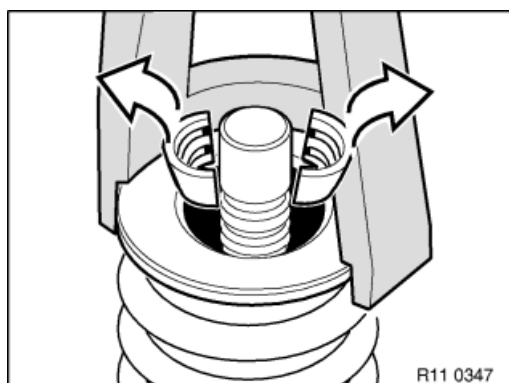


Align special tool 11 9 006 .

Lock eccentric (1) on special tool 11 9 001 in direction of arrow



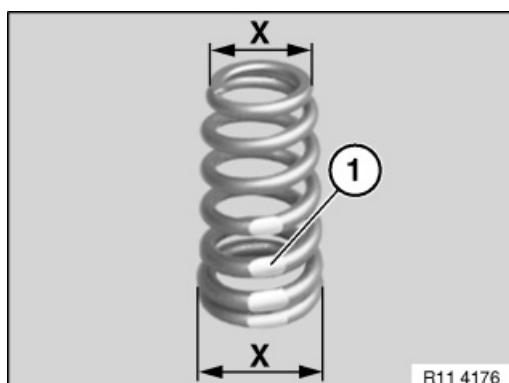
Press down valve spring and spring cup (1) with special tool 11 9 017 .



Remove valve keys with a magnet.

Remove valve spring and spring cup.

Set down on special tool 11 4 480 in a tidy and orderly fashion.



Important!

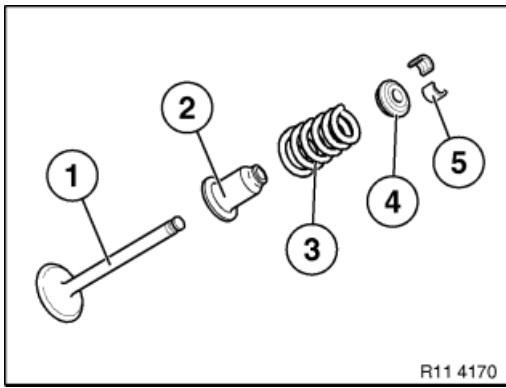
Incorrect assembly possible.

Incorrect assembly will result in valve spring breakage.

Colour coding (1) is normally on lower end of valve spring.

The larger diameter must point downwards to the valve stem seal.





Arrangement:

- 1) Valve
- 2) Valve stem seal with spring cup, bottom
- 3) Valve spring
- 4) Top spring cup
- 5) Valve keys



Assemble engine.
Check function of DME.

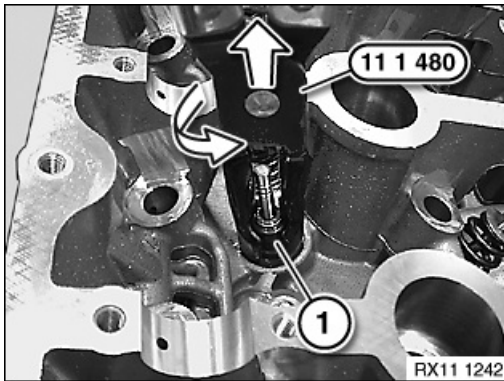


**Special tools required:**

- 11 1 480
- 11 6 380

*Necessary preliminary tasks:*

- Remove cylinder head.
- Remove exhaust camshaft.
- Remove intake camshaft.
- Remove roller cam follower.
- Remove all valve springs.

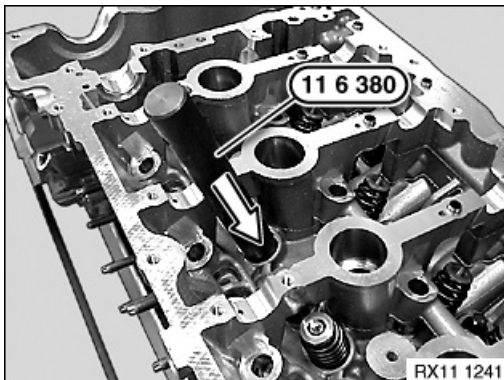


Firmly press special tool 11 1 480 onto old valve stem seals.

Detach valve stem seal from valve stem by turning and simultaneously pulling special tool 11 1 480 .

Installation note:

Insert all valves.

*Installation note:*

Fit the assembly sleeves (plastic sleeves) supplied in the new part on the valve stem end.

Lubricate assembly sleeve.

Press on valve stem seal with special tool 11 6 380 by hand up to stop.



Assemble engine.



**Important!**

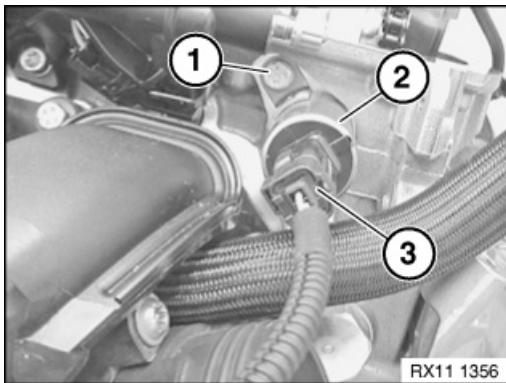
Always check that the solenoid valves are clean during removal and installation.

Possible malfunction if there is dirt contamination in the valves:

- Irregular operation.
- OBD fault entry.
- Exhaust emission behaviour.
- Low engine performance.

*Necessary preliminary tasks:*

- Remove acoustic cover

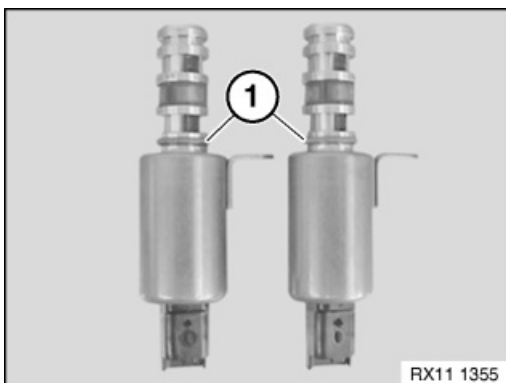
*Note:*

Graphic shows intake valve.

Disconnect plug connection on solenoid valve (3).

Release screw (1).

Remove solenoid valve (2).

*Installation note:*

Replace sealing rings on solenoid valve.



Assemble engine.

Check function of DME.



**Special tools required:**

- 00 9 120
- 11 9 550
- 11 9 551
- 11 9 552
- 11 9 590
- 11 7 440
- 11 9 340

**Attention!**

Mount special tool 11 9 550 to open the central bolts on the intake adjuster and the camshaft.

The timing is not determined at the firing TDC of cylinder no. 1.

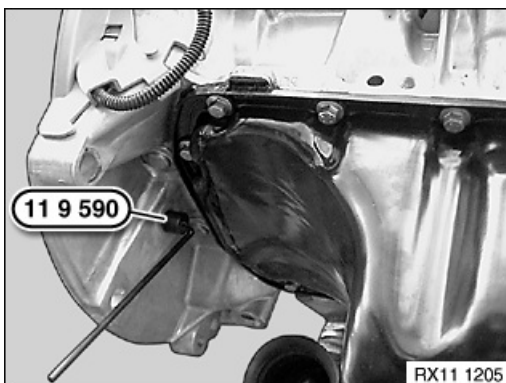
Modified procedure for timing adjustment.

All pistons are in the 90° position.

Check the adjusters' locks.

**Necessary preliminary tasks:**

- Remove cylinder head cover.
- Check timing.



Slide in special tool 11 9 590 in direction of arrow.

Crank the flywheel (1) on the central bolt until TDC firing position (first cylinder) has been reached.

Attention!

The OT hole can be accidentally mixed up.

**Attention!**

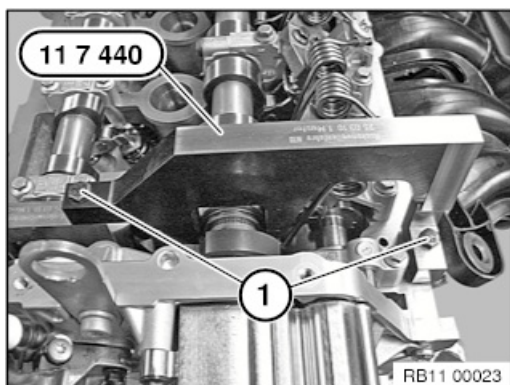
Check lock on VANOS unit.

Turn camshaft in direction of rotation at hexagon head.

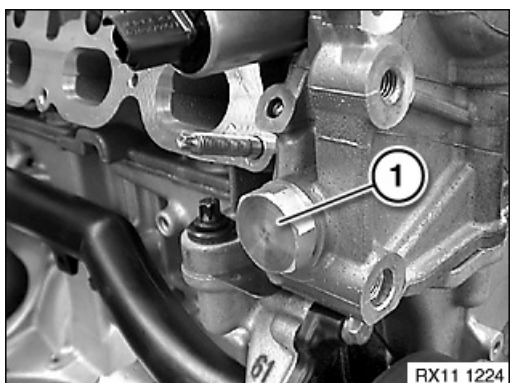
The adjusters are locked in the initial position when the camshafts are non-positively connected to the adjusters.

If no fixed connection to the camshaft can be established, the adjuster is faulty and must be replaced.

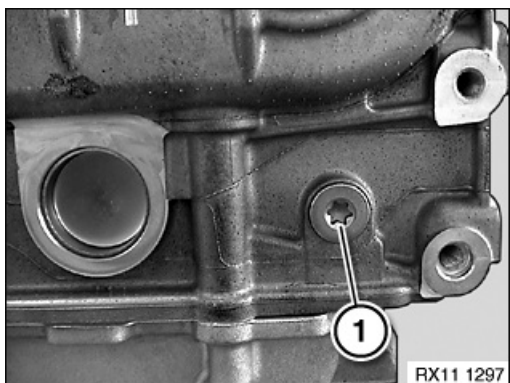




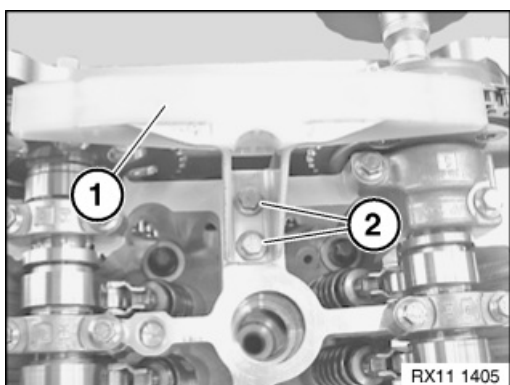
Place special tool 11 7 440 onto the camshafts and secure using the two screws (1).



Release chain tensioner (1) (have a cleaning cloth ready).
Tightening torque: 11 31 4AZ.

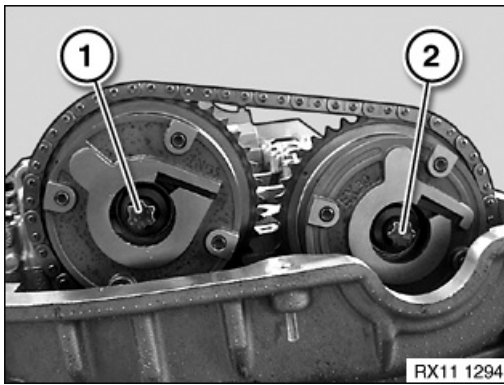


Release screw (1).



Unfasten screws (2).
Remove slide rail (1).



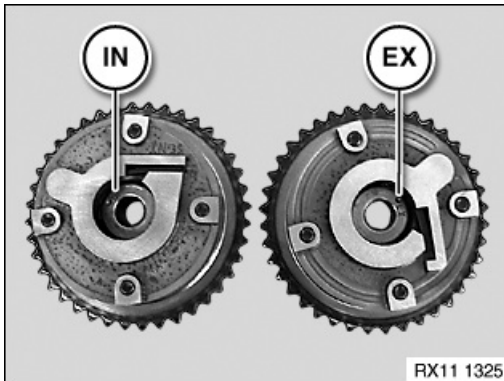


Attention!

Loosen and secure the central bolts (1) and (2) using special tool 11 7 440 only.

Loosen the central bolts (1) and (2).

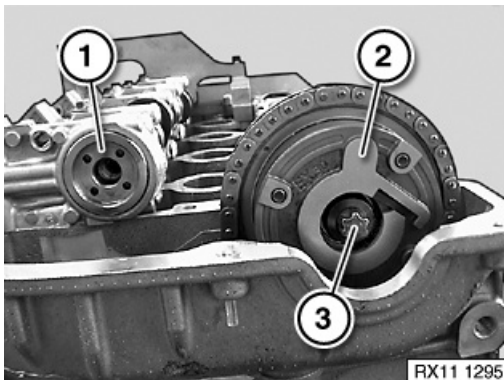
Take VANOS units off of the timing chain.



The intake and exhaust camshaft adjusters are different.

VANOS is marked with IN for the intake camshaft.

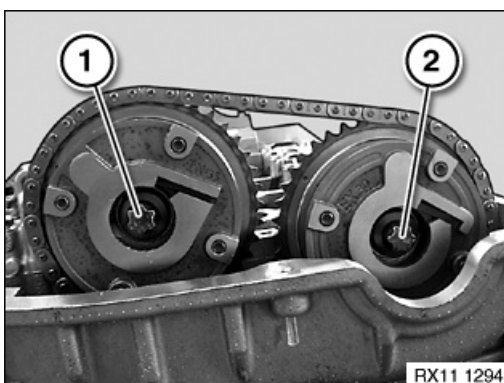
VANOS is marked with EX for the exhaust camshaft.



Position exhaust camshaft adjuster (2) at exhaust camshaft.

The installation position of the camshaft adjusters can be freely selected.

Screw in central bolt (3) and release again by 90°.

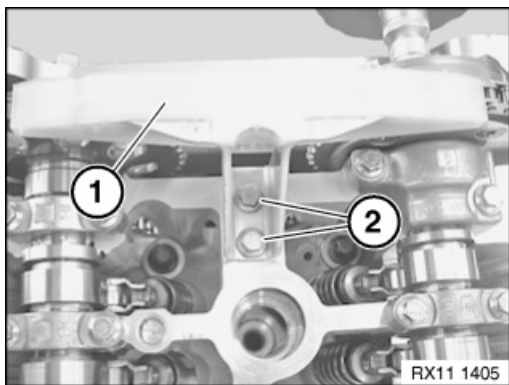


Position intake camshaft adjuster at intake camshaft.

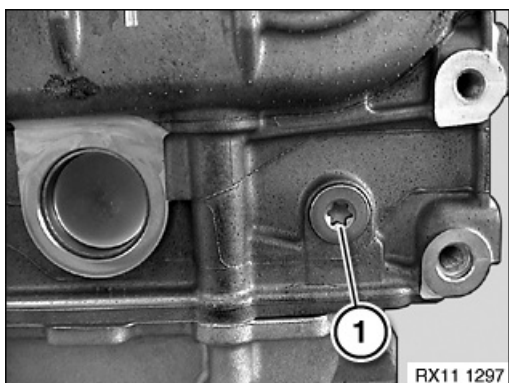
The installation position of the adjuster can be freely selected.

Screw in central bolt (1) and release again by 90°.

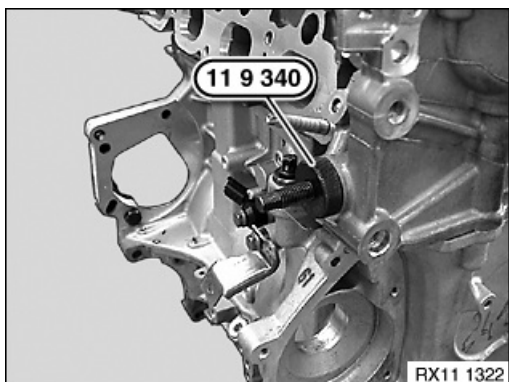




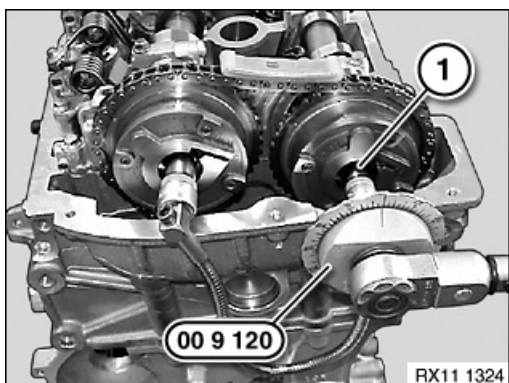
Install tensioning rail (1).
Insert bolts (2).



Insert screw (1).
Tightening torque. 11 31 2AZ.

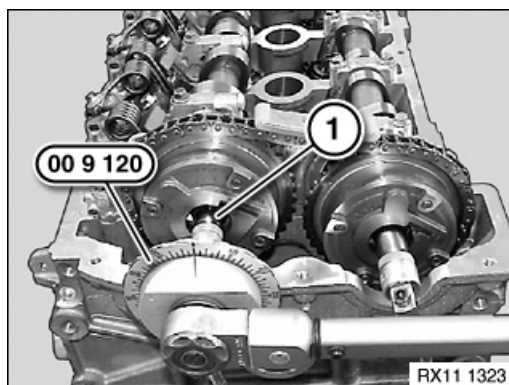


Screw special tool 11 9 340 into the cylinder head.
Pre-tension timing chain with special tool to **0.6 Nm**.



Secure central bolt (1) with special tool 00 9 120 .
Tightening torque: 11 36 1AZ.





Secure central bolt (1) with special tool 00 9 120 .
Tightening torque: 11 36 1AZ.



Fit chain tensioner.
Check timing.
Assemble engine.

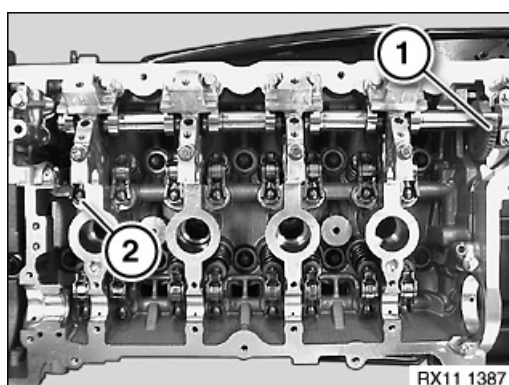


**Special tools required:**

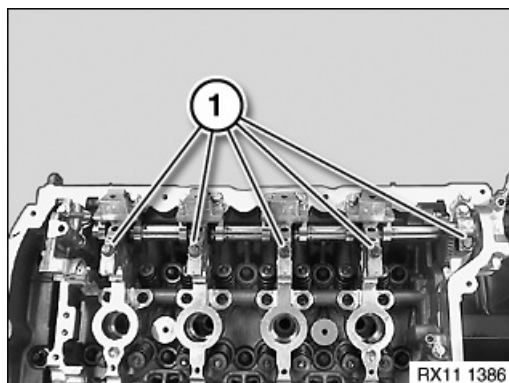
- 11 4 481

*Necessary preliminary work:*

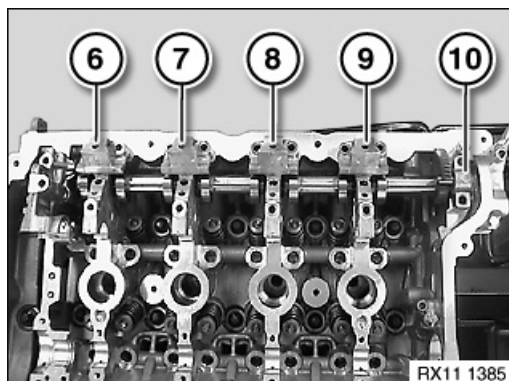
- Remove cylinder head cover.
- Remove intermediate lever.
- Remove intake camshaft.



Adjust eccentric shaft to minimum lift (1) via the actuator drive.

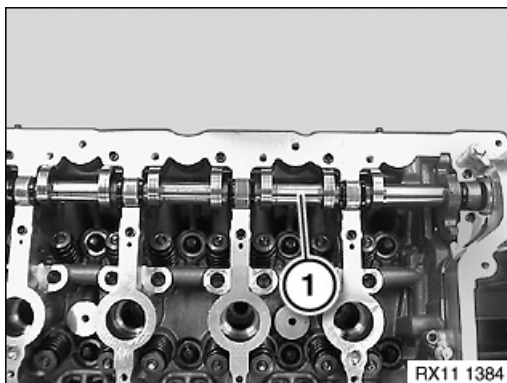


Release screws on all bearing caps (1).

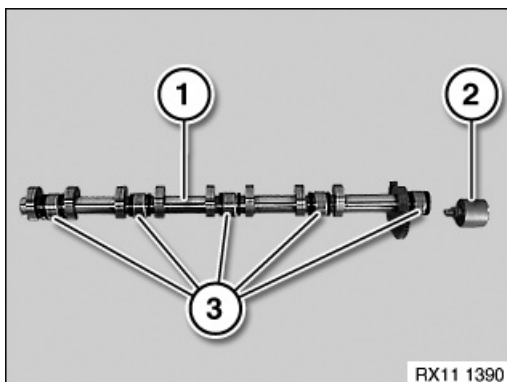


All bearing caps are marked with numbers (from 6 to 10); place in order in special tool 11 4 481 .





Remove intermediate shaft (1).

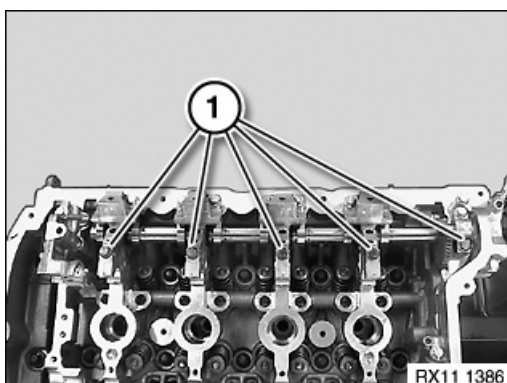


Important!

If one or more needle bearings are faulty, the complete eccentric shaft must be replaced.

Check all needle bearings (3) of eccentric shaft (1) for ease of movement.

Position (2) is not installed.



Bearing cap number 10 is provided with a stop.

Lubricate all bearing caps with engine oil.

All bearing caps (1) are identified with numbers (from 6 to 10).

Tightening torque: 11 12 6AZ.

Adjust eccentric shaft minimum lift.



Check eccentric shaft for ease of movement.

Assemble engine.



**Special tools required:**

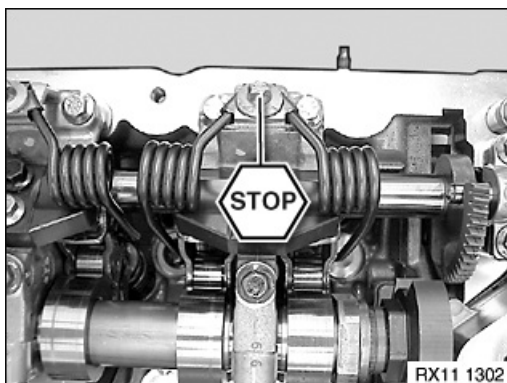
- 11 4 480
- 11 9 571
- 11 9 572
- 11 9 573

**Warning!****Danger of injury!**

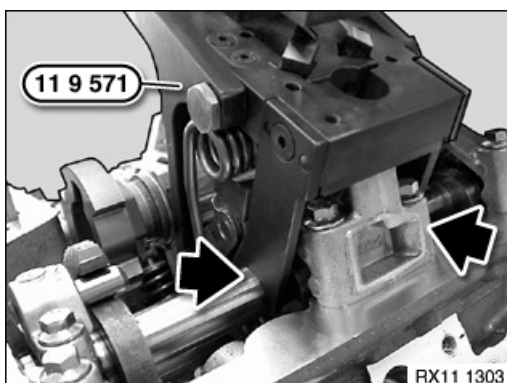
A special tool is essential for opening the throttle return spring on the intermediate lever.

*Necessary preliminary tasks:*

- Remove cylinder head cover.

**Important!**

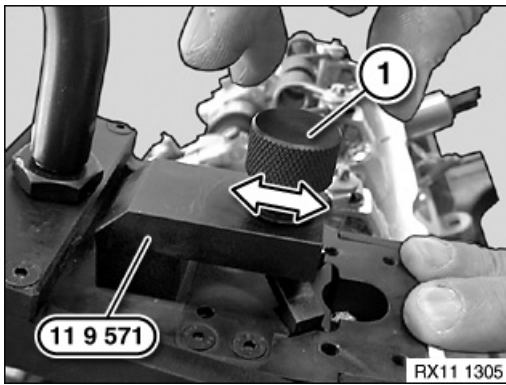
Release screw with special tool only. 11 9 571



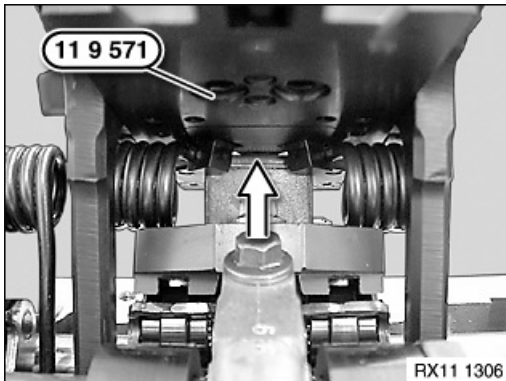
Position special tool 11 9 571 at bearing support of counterbalance shaft so that it is resting on intermediate shaft (see arrows).

Set eccentric shaft (1) to minimum lift if necessary.

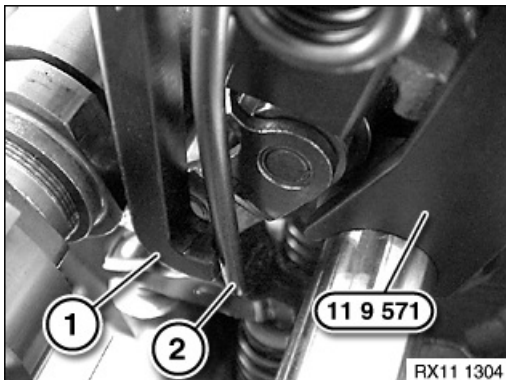




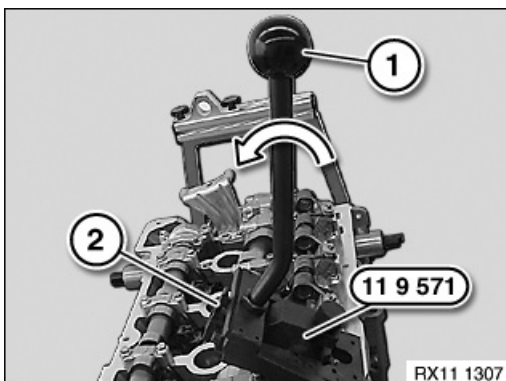
Clamp throttle return spring with knurled screw (1).



Throttle return spring at special tool 11 9 571 , pay attention to correct seating (see arrow).

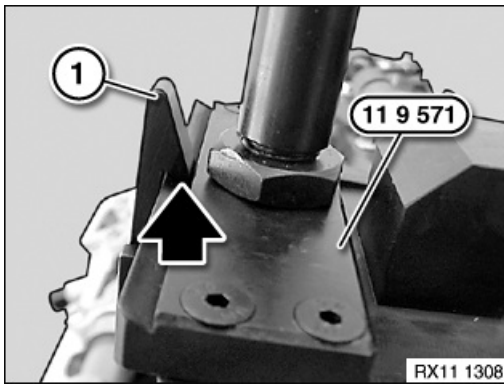


If the special tool 11 9 571 is correctly position, the throttle return spring (2) can be pushed back using lever (1).



Push lever (1) in direction of arrow at special tool 11 9 571 until the safety hook (2) engages at the special tool 11 9 571 .

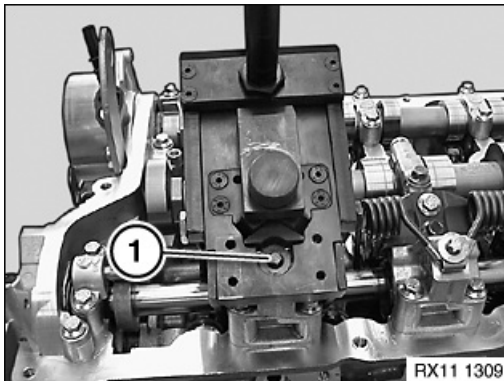




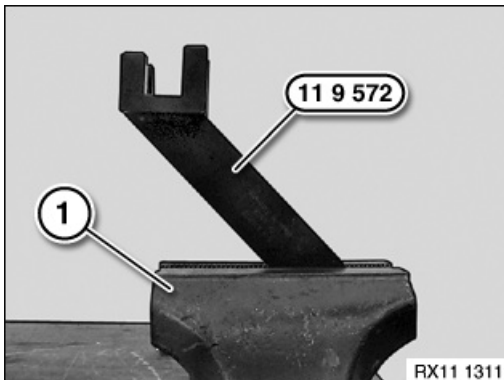
Warning!

Danger of injury! at throttle return spring.

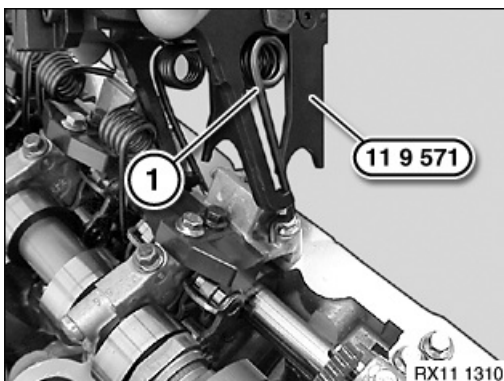
Safety hook (1) must engage at special tool 11 9 571 (see arrow).



Release screw (1).

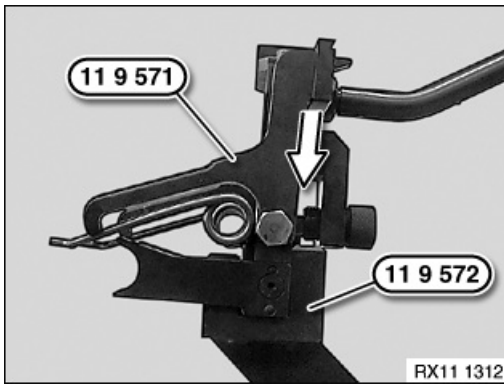


Prepare special tool 11 9 572 in a vice (1).

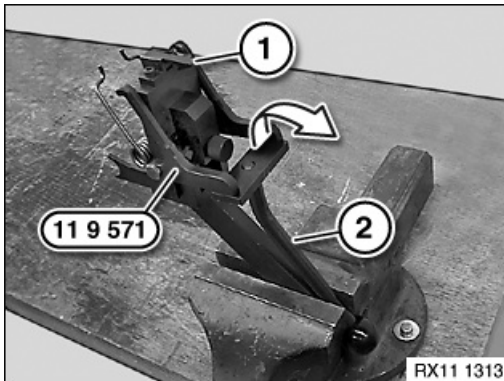


Feed out special tool 11 9 571 with the torsion spring (1).





Place special tool 11 9 571 onto special tool 11 9 572 .

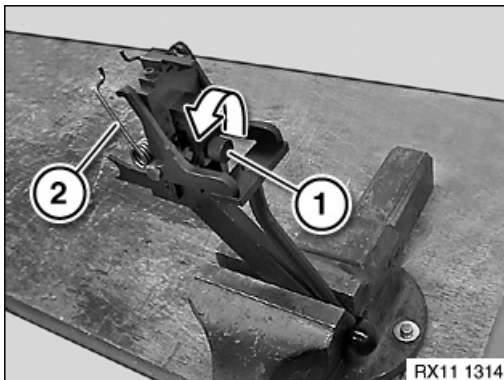


Warning!

Danger of injury! at throttle return spring.

Release safety hook (1) at special tool 11 9 571 .

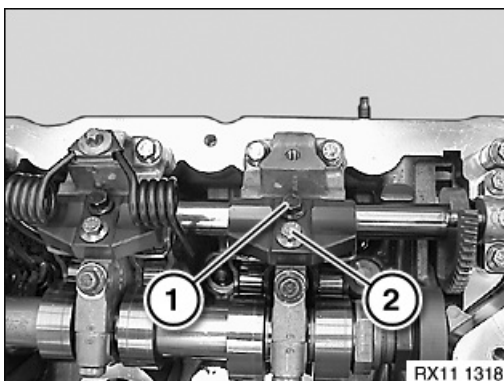
Release lever (2) in direction of arrow.



Release knurled screw (1) in direction of arrow.

Remove return spring (2).

Place all throttle return springs onto special tool 11 4 480 in an orderly and tidy fashion.

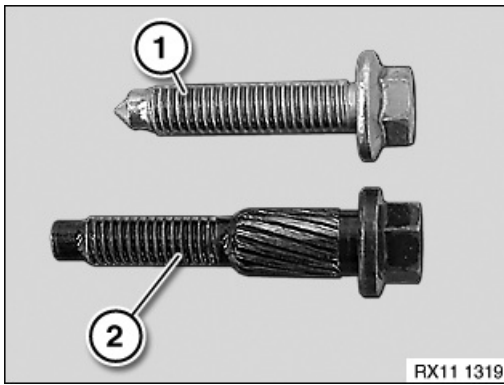


Release screw (2).

Release centring bolt (1).

Remove retaining plate and put onto special tool 11 4 480 in an orderly and tidy fashion.





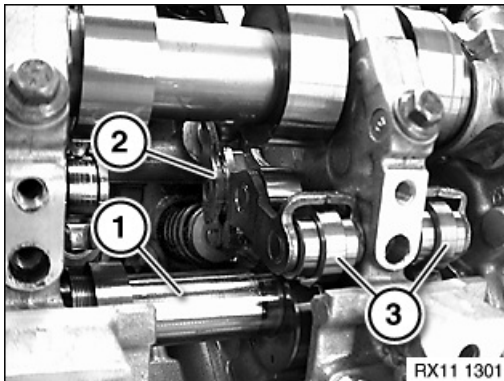
Note:

Screw (1)

Fitting screw (2).

Installation note:

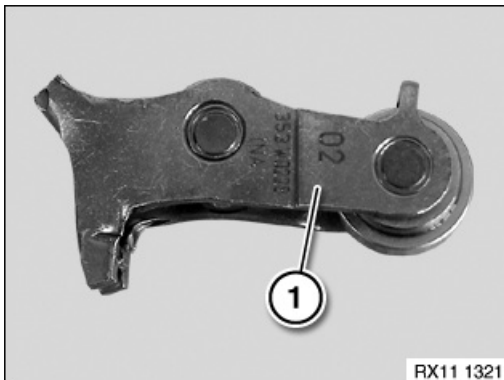
Observe screwing sequence



Remove intermediate lever (3) from above and put down onto special tool 11 4 480 in an orderly and tidy fashion.

Installation note:

Uniform distribution must not be changed.

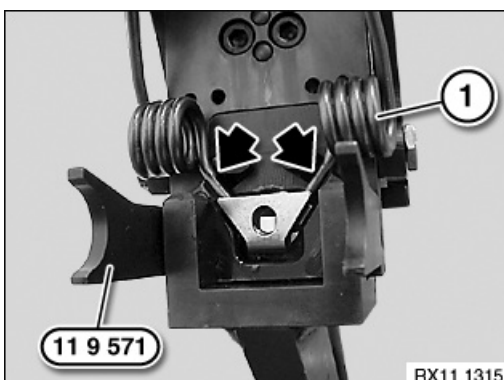


All intermediate levers are classified.

Values of 0 to 5 are installed.

Note:

A uniform distribution can only be calculated with the diagnosis system.

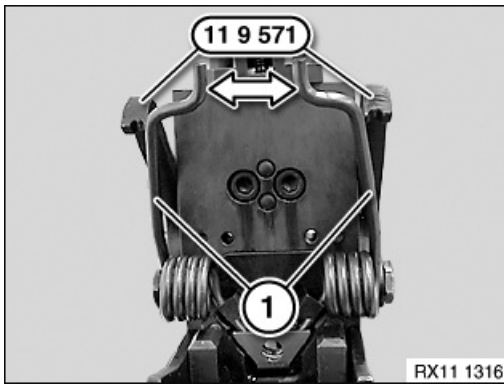


Installation note:

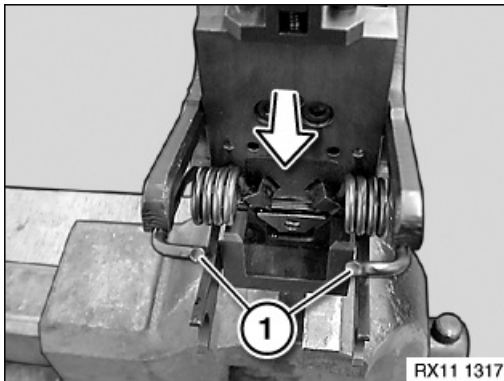
Installation of intermediate levers.

Position torsion spring (1) onto special tool 11 9 571 (see arrows) and clamp using knurled screw.

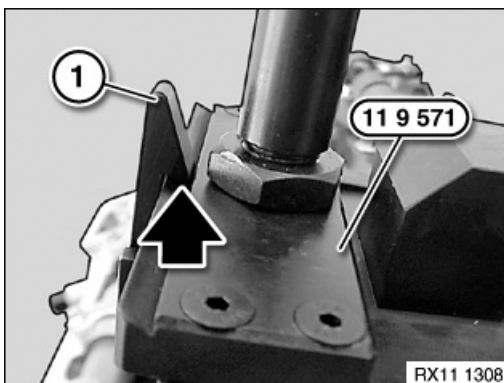




Press torsion spring (1) in direction of arrow and position at special tool 11 9 571 with lever.



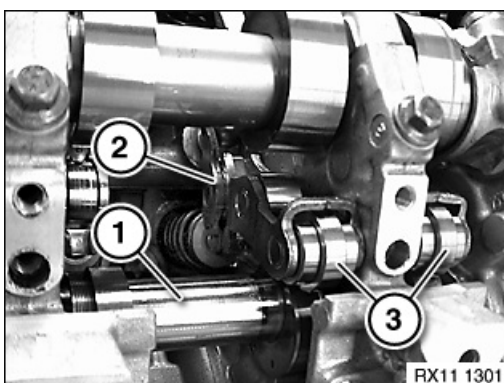
Pre-tension torsion spring (1) with special tool 11 9 571 in direction of arrow.



Warning!

Danger of injury! at torsion spring.

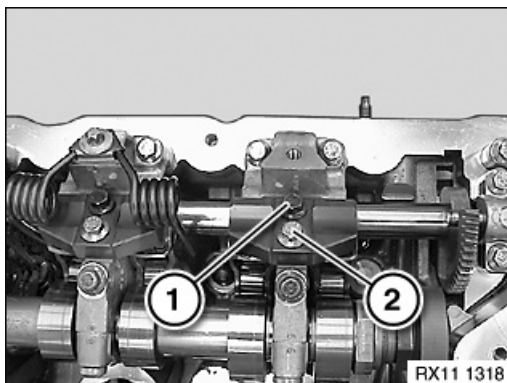
Safety hook (1) must engage at special tool 11 9 571 (see arrow).



Insert intermediate levers (3). *Installation note:*

Make sure roller cam followers (2) are in correct installation position.





Installation note:

Make sure that rollers of intermediate lever are correctly guided on/in guide block.

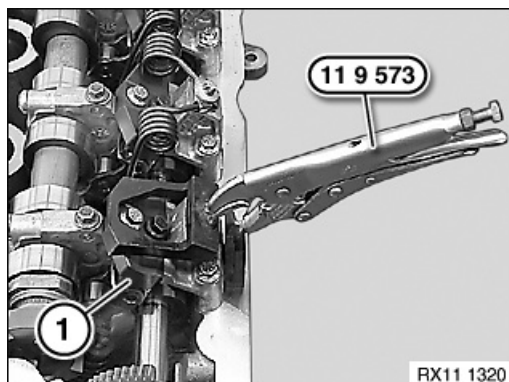
Install guide block.

Insert fitting screw (1).

Insert bolt (2).

Join screws (1 and 2) to 5 Nm.

Release screws (1 and 2) back by 90°.



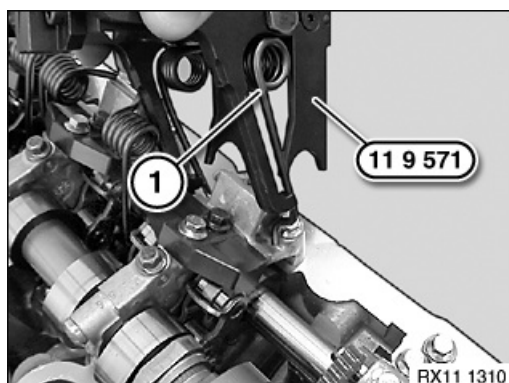
Pre-tension guide block (1) with special tool 11 9 573 .

Secure fitting screws of guide block (1).

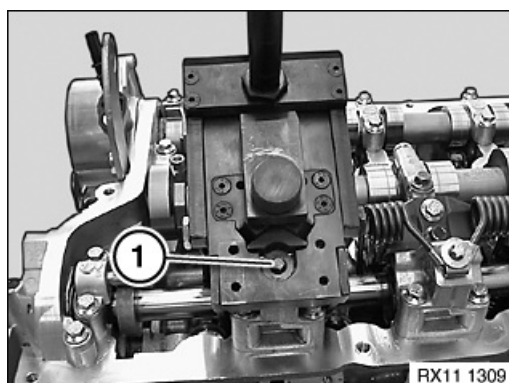
Tightening torque: 11 37 1AZ.

Secure screw on guide block (1).

Tightening torque: 11 37 2AZ.



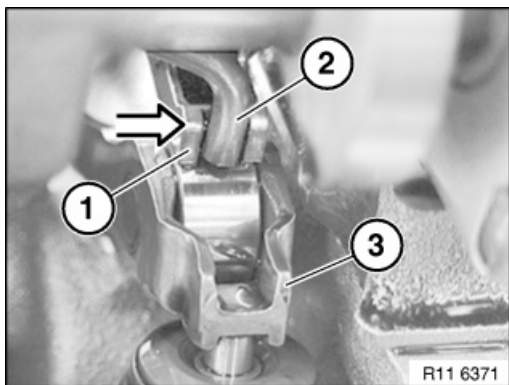
Feed in throttle return spring (1) with special tool 11 9 571 and position.



Secure screw (1) of throttle return spring.

Tightening torque: 11 37 3 AZ.





Installation note:

Insert return spring (2) into intermediate lever (1) (see arrow).

Check intermediate lever (1) and roller cam follower (3) again for correct installation position.



Remove all special tools.

Assemble engine.

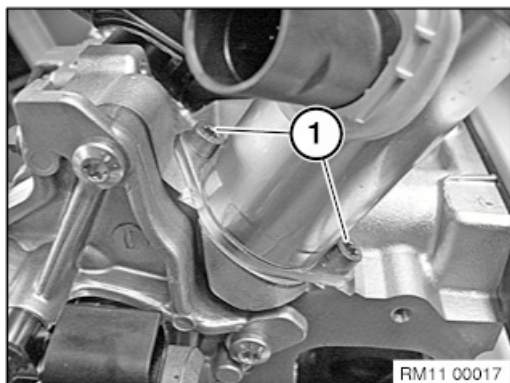


11 37 020 Removing and installing/replacing positioning servomotor for eccentric shaft (N18)



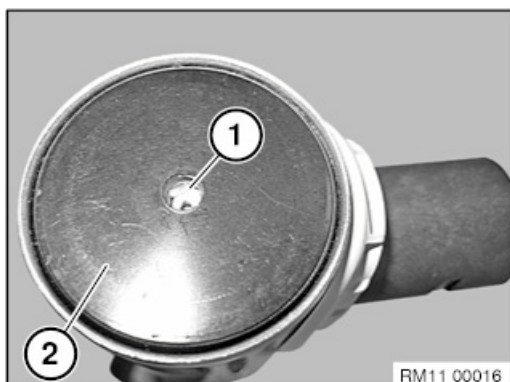
Necessary preliminary work:

- Remove acoustic cover.



Disconnect the plug connection on the actuator drive.

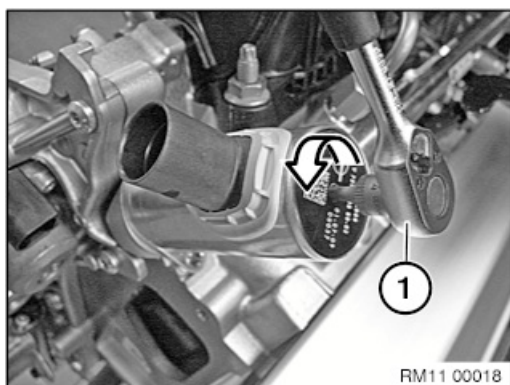
Release screws (1).



Note:

The protective film on the adjusting screw (1) on the actuator drive (2) must be punched through.

Graphic shows protective film removed.



Important!

Risk of damage to the intermediate shaft.

Use a hexagon socket wrench for the reversible ratchet (1) to turn the shaft in direction of the arrow to the left and relax the intermediate shaft.

Note:

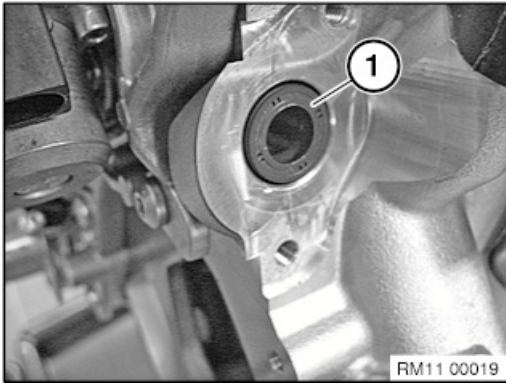
Do not rotate shaft too far; do not rotate past the end stop.

Remove actuator drive.

Installation note:

Insert actuator drive with screwdriver (2).

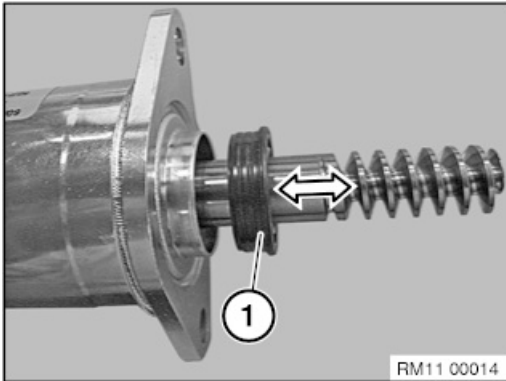




Important!

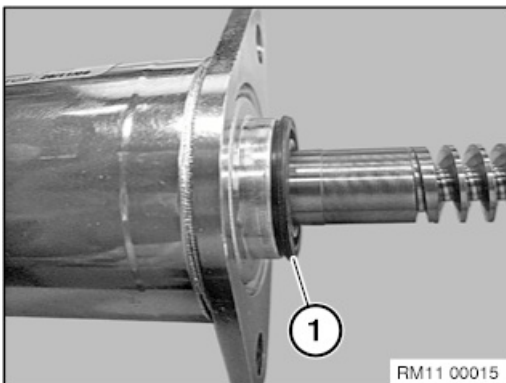
Risk of damage to sealing surface.

Lever out the shaft seal (1) with a suitable tool, if applicable.



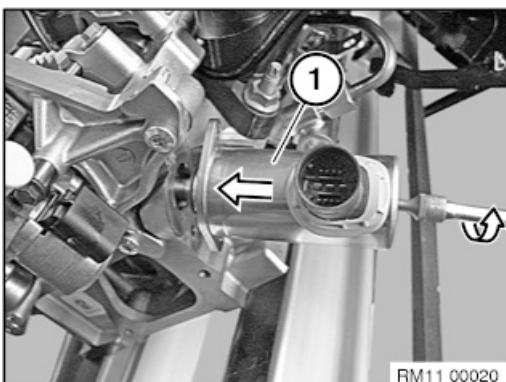
Installation note:

Detach the shaft seal (1) in direction of arrow and replace.



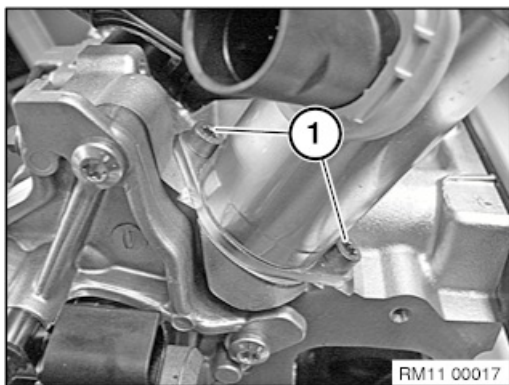
Installation note:

Press the shaft seal (1) to the limit position on the housing.



Screw in the actuator drive (1) in direction of arrow evenly with the shaft over the gearing of the intermediate shaft to the limit position.

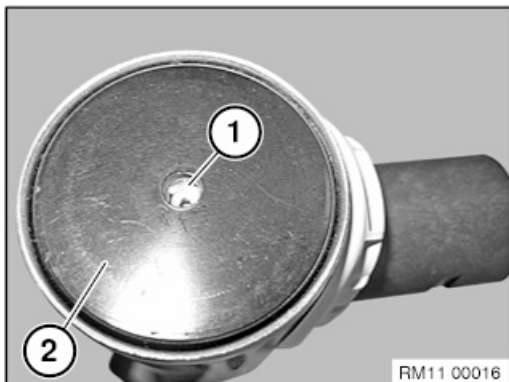




Insert bolts (1).

Tightening torque: 11 37 4AZ.

The plug connection must audibly engage at the actuator drive.



Installation note:

Bond the protective film over the adjusting screw (1).



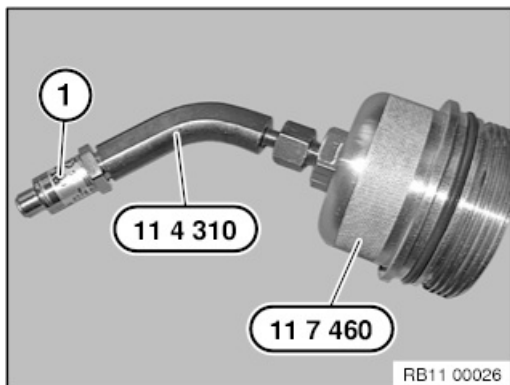
Assemble engine.

Check function of Digital Engine Electronics.



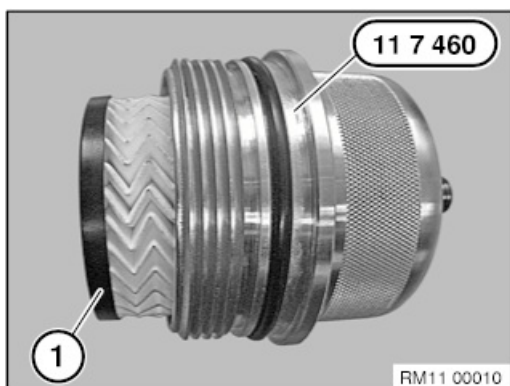
**Special tools required:**

- 11 7 460
- 11 4 310



Screw special tool 11 7 460 and 11 4 310 together.

Apply light coating of oil to sealing ring at pressure sensor (1) 100 bar.



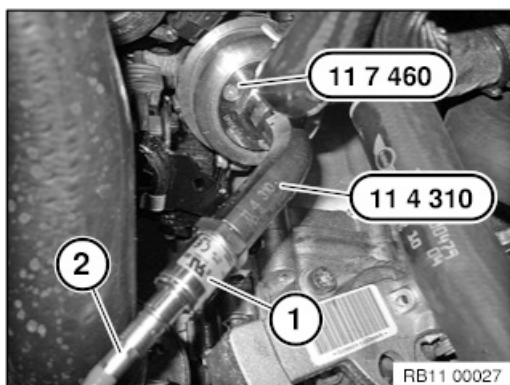
Unscrew and remove oil filter housing.

Insert oil filter element (1) into special tool 11 7 460 .



Screw in special tool 11 7 460 .





Check engine oil pressure with diagnosis system.

Screw special tool 11 7 460 to oil filter housing.

Screw special tool 11 4 310 to special tool 11 7 460 .

Hand-tighten the 100 bar pressure sensor (1) on the special tool 11 4 310 .

Connect cable (2) of IMIB (Integrated Measurement Interface Box) to pressure sensor (1) 100 bar.



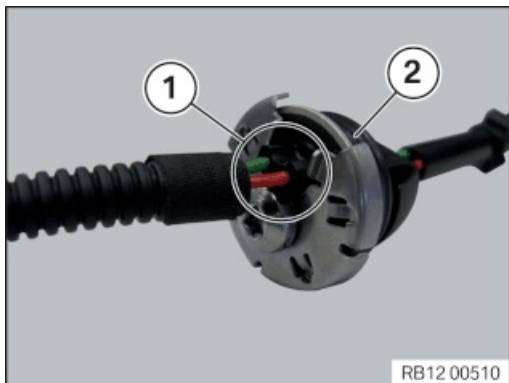
Start engine and observe diagnosis instructions.





Attention!

Only one repair kit may be installed.



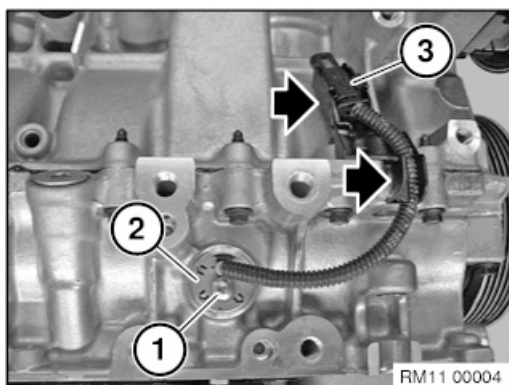
Note:

Repair kit is identifiable from the individual wires (green/red) (1) and the black coating of the cable duct (2).



Necessary preliminary work:

- Remove front underbody protection (only N13)
- Remove right output shaft (all N16/N18)
- All-wheel drive vehicle with manual gearbox only: Remove transfer box
- Remove bottom engine block (only transverse installation)



All vehicles:

Release screw (1).

Remove sealing plate (2).

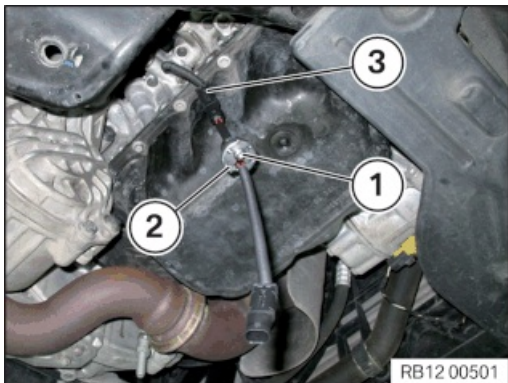
Unfasten plug connection (3) and disconnect.

Unclip cable from cable clip.

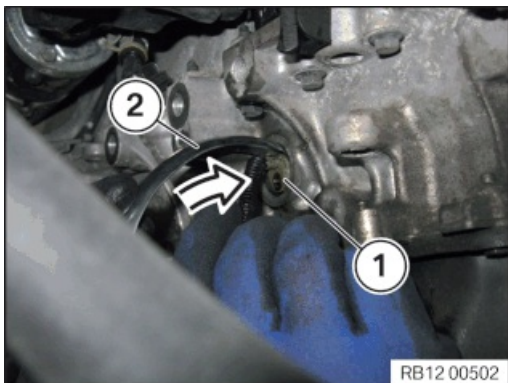




Lever out sealing ring (1).
Feed out and remove sealing ring (1).

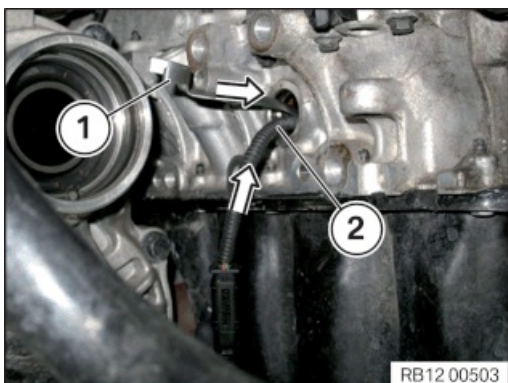


Loosen bolt (1) by approx. 2 rotations.
Connect new cable duct (2) to previous cable duct (3).



Note:
Previous cable duct remains in oil sump.

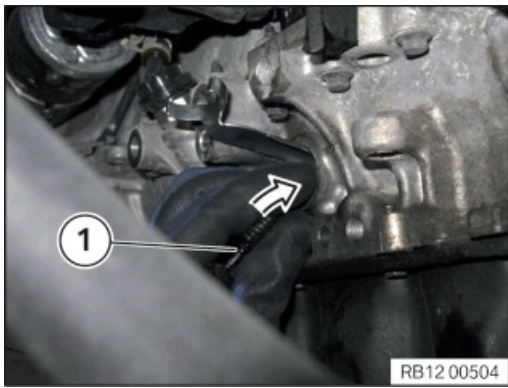
Slide in previous cable duct (1) into oil sump by using supplied tool (2).



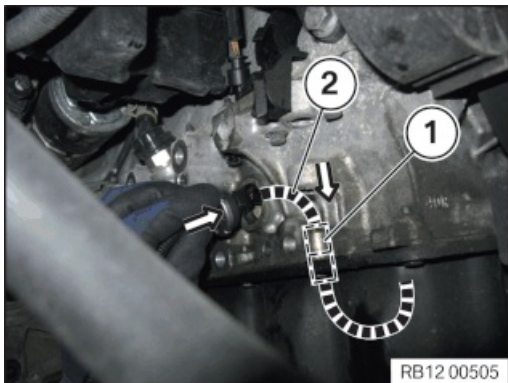
Note:
Schematic diagram of all-wheel drive vehicle.

Insert tool (1) and previous cable duct (2) as deep as possible past oil deflector.



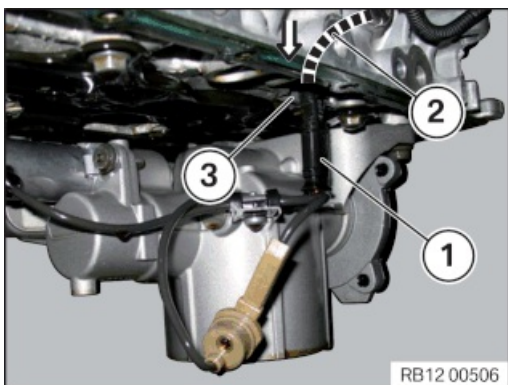


Insert cable with plug connection (1).



To make sure that connector housing (1) was inserted past oil deflector, cable (2) must point downwards and may not be kinked.

Remove tool.



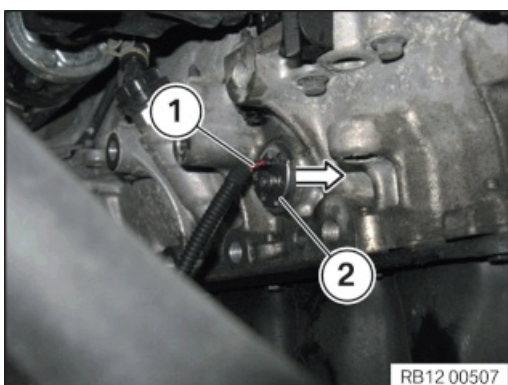
Note:

Oil sump shown removed for purposes of clarity.

(1) Connector housing

(2) Cable

(3) Oil deflector



Note:

Cable outlet (1) must point upwards.

Press in new cable duct (2) into crankcase until it is felt to engage.





Note:

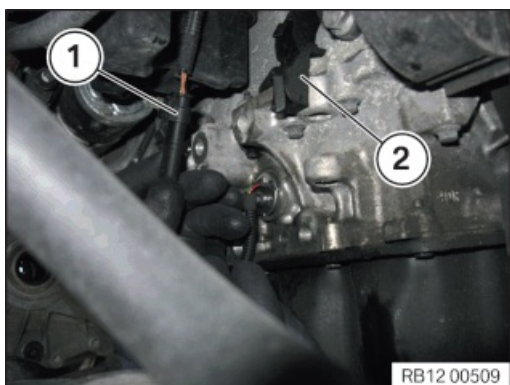
Schematic diagram of all-wheel drive vehicle.

Insert tool (1) into recesses of sealing plate.

Hold handle vertically and counter support.

Screw sealing plate.

Tightening torque 11 41 5AZ.



If necessary, retrofit additional wiring harness for oil pump solenoid valve.

Establish plug connection (1) and clip in into cable clip (2).



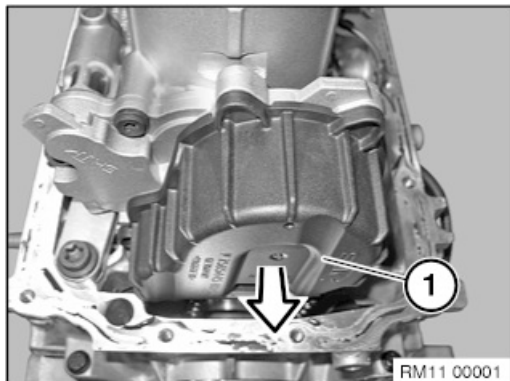
Reassemble the vehicle.



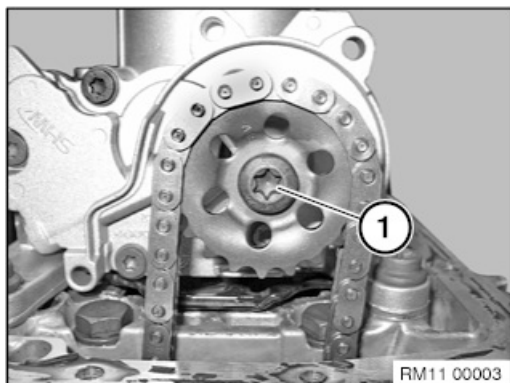


Necessary preliminary work:

- Removing oil sump.



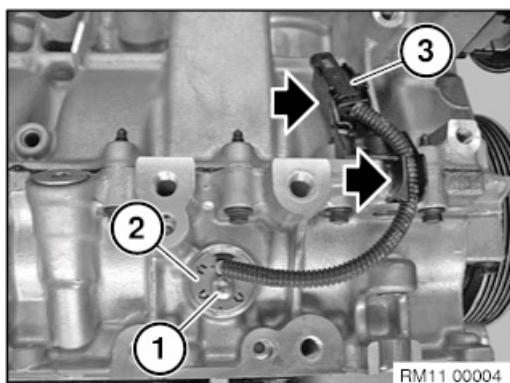
Pull off cover (1) in direction of arrow.



Release screw (1).

Tightening torque: 11 41 2AZ.

Counter-hold crankshaft central bolt to release central bolt (1).



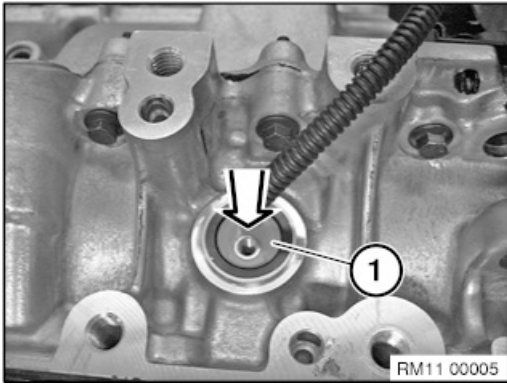
Release screw (1).

Remove sealing plate (2).

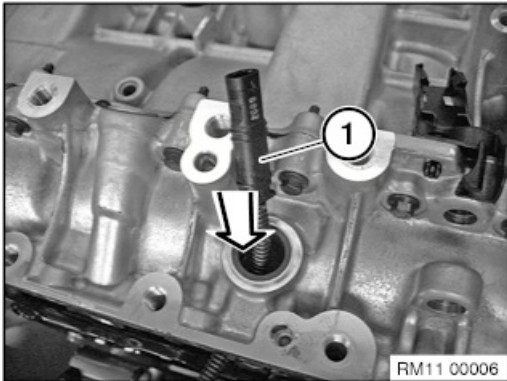
Disconnect plug connection (3).

Unclip cable from cable clip.

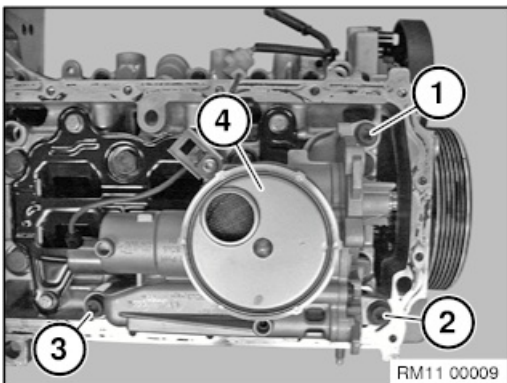




Press out counter support (1) with cable in direction of arrow.



Feed cable (1) through the bore hole.



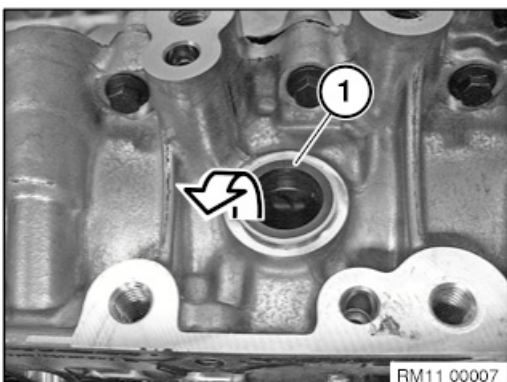
Unfasten screws (1,2 and 3).

Remove oil pump (4).

Tightening torque: 11 41 1AZ.

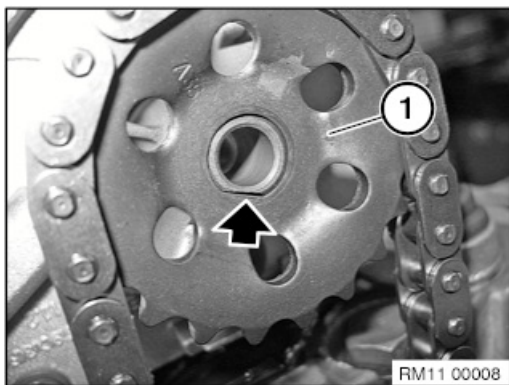
Installation note:

Clean sealing surfaces.



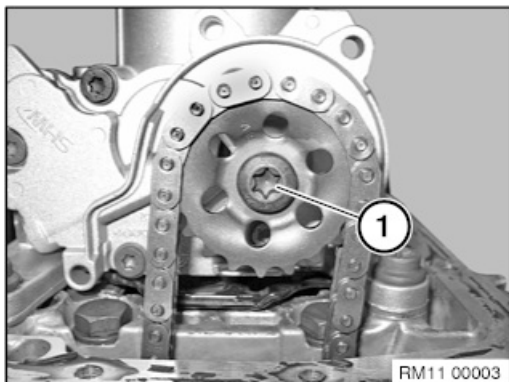
Remove sealing ring (1) in direction of arrow. *Installation note:*
Replace sealing ring (1).





Installation note:

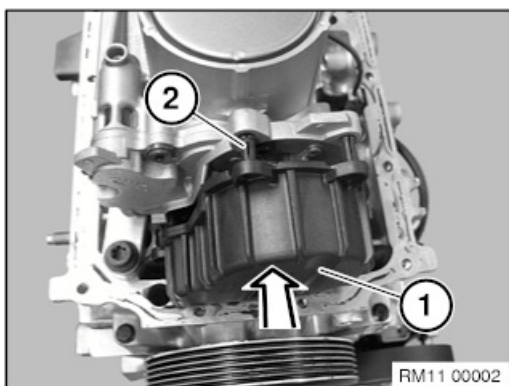
Position oil pump chain with sprocket (1) on the oil pump shaft.



Insert screw (1).

Tightening torque: 11 41 2AZ.

Counter-hold crankshaft central bolt to secure central bolt (1).



Seat cover (1) on oil pump (2) in direction of arrow.



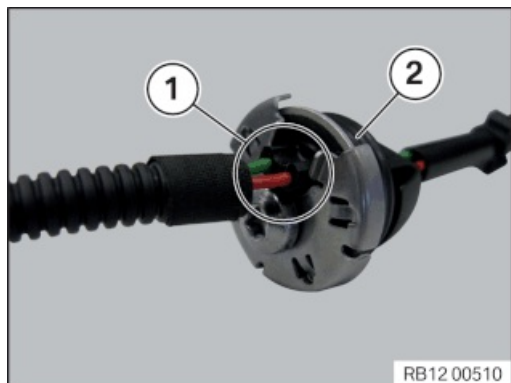
Assemble engine.





Necessary preliminary work:

- Partially remove output shaft on the right (transmission end only).
- Removing oil sump.



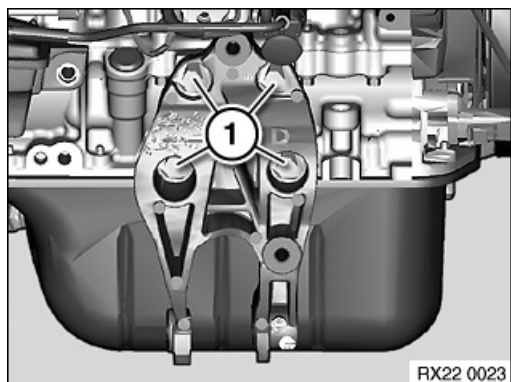
Important!

A solenoid valve wiring repair kit may be installed.

Repair kit must be removed for replacement of the solenoid valve.

Note:

Repair kit is identifiable from the individual wires (green/red) (1) and the black coating of the cable duct (2).



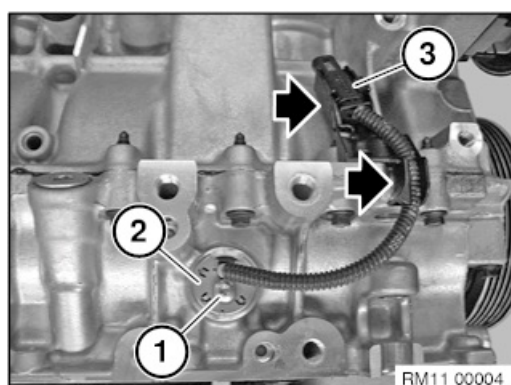
Unscrew holder from crankcase (only R60).

Release screws.

Tightening torque 22 11 5AZ.

Note:

Similar to graphic.



Release screw (1).

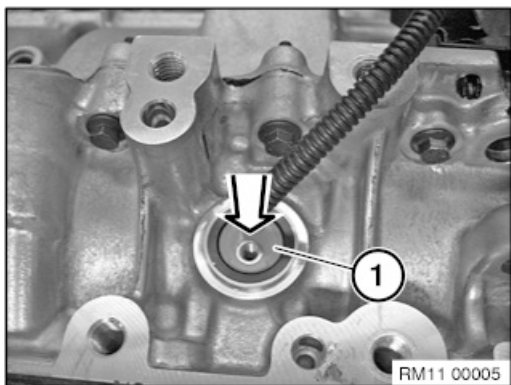
Tightening torque 11 41 5AZ.

Remove sealing plate (2).

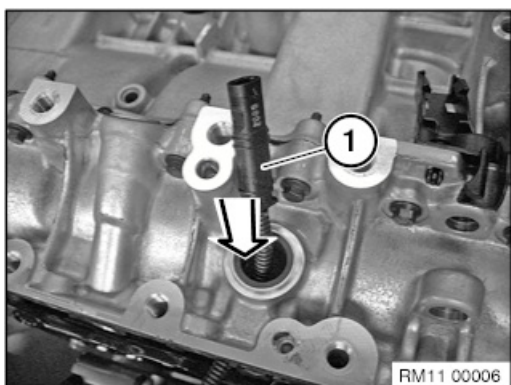
Disconnect plug connection (3).

Unclip cable from cable clip.

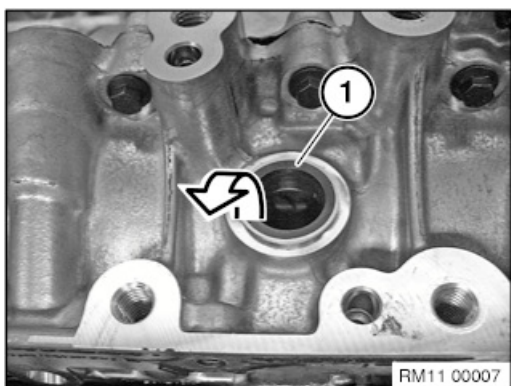




Press out counter support (1) with cable in direction of arrow.

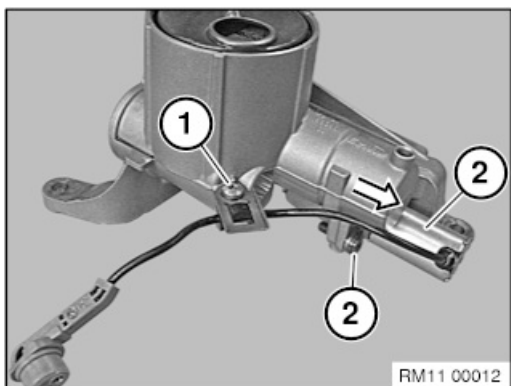


Feed cable (1) through the bore hole.



Remove sealing ring (1) in direction of arrow. *Installation note:*
Replace sealing ring (1).

If there is damage to the crankcase, seal with Loctite 5970 sealant.



Release screw (1).

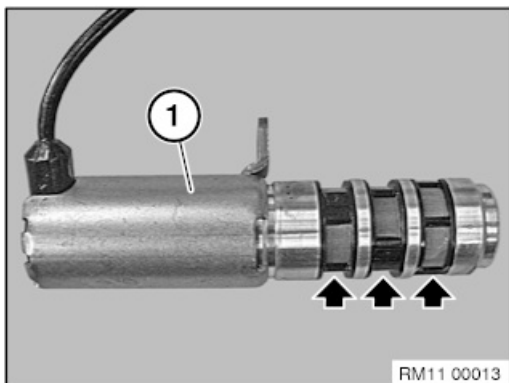
Tightening torque: 11 41 3AZ.

Release screw (2).

Tightening torque: 11 41 4AZ.

Pull solenoid valve (3) off in direction of arrow.





Installation note:

Check the strainer on the solenoid valve (1) for dirt contamination and clean if necessary.

Do not use compressed air to clean the strainer! **Risk of damage!**



Assemble engine.



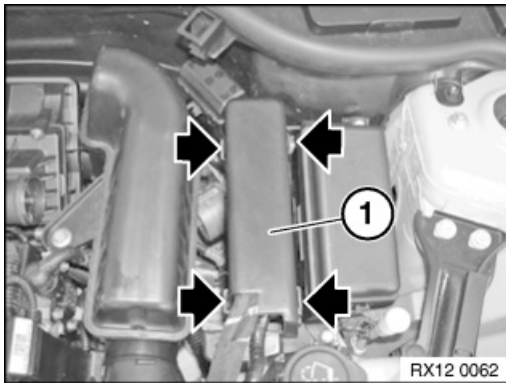


Comply with notes on processing cables.



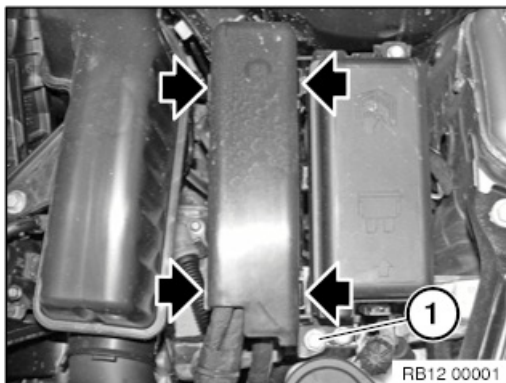
Necessary preliminary tasks:

- Disconnect battery earth lead
- Install repair kit for oil pump solenoid valve wiring
- Remove intake silencer housing



Version 1:

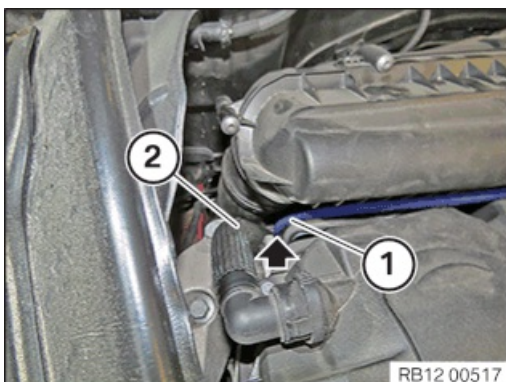
Unlock and remove cover (1).



Version 2:

Release screw (1) at side.

Unlock clamps and remove cover.



N16:

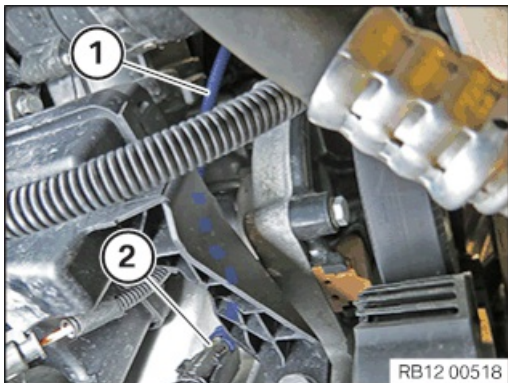
Feed additional wiring harness (1) downwards under tank ventilation line (2) as shown.





N18:

Lay additional wiring harness (1) downwards around intake plenum as shown.

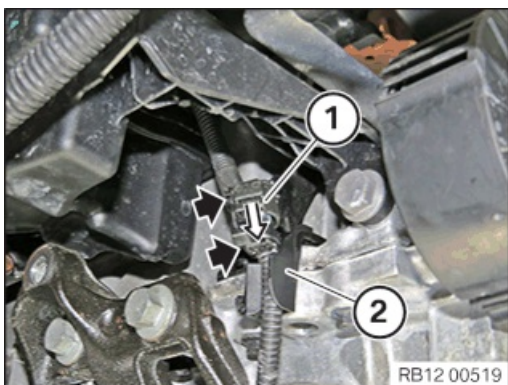


N16 and N18:

Lay additional wiring harness (1) downwards behind coolant pipe.

Connect additional wiring harness (1) to oil pump solenoid valve wiring (2).

Clip plug connection (2) into holder.

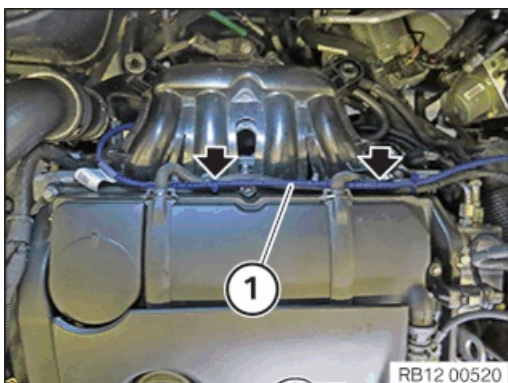


N16 and N18:

Attention!

Existing wiring harness (1) must not remain loose.

Secure existing wiring harness (1) facing downwards to new plug connection (2).



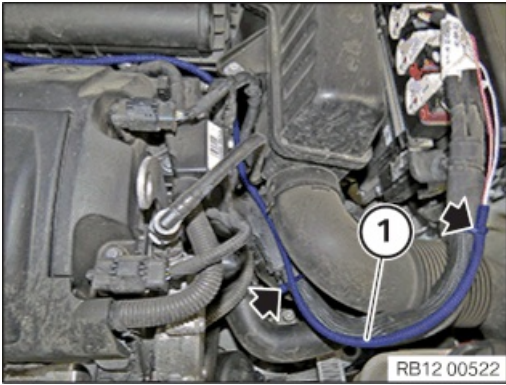
N16 and N18:

Lay and connect additional wiring harness (1) as shown.

Note:

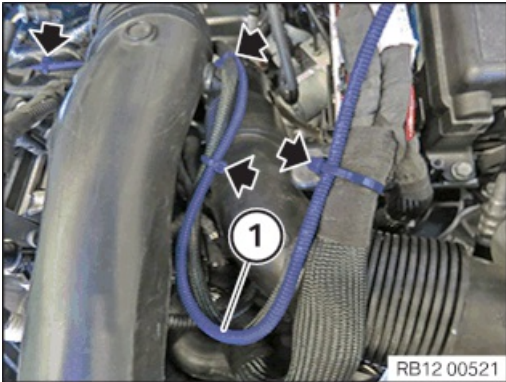
Figure N18.





N16:

Lay and connect additional wiring harness (1) as shown.



N18:

Lay and connect additional wiring harness (1) as shown.



N16:

Connect additional wiring harness as follows:

Attention!

The prior connection of the power supply line (orange) must continue to exist.

Crimp pin 1 (red) of the additional wiring harness onto pin 41 of 53-pin control unit connector X60211 (1) on engine wiring harness.

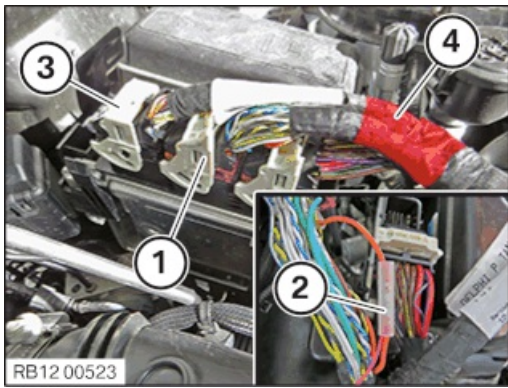
To do so, first disconnect the cable from the engine wiring harness (orange) and then reconnect. While doing so, also connect the cable from the additional wiring harness (red). You now have a 3-cable connection here.

Connect **pin 2 (white)** onto chamber A1 of 32-pin control unit connector X60212 (3). The original signal line is no longer needed and can be tied back.

Note:

Set cable connector in marked area (4).





N18:

Connect additional wiring harness as follows:

Attention!

The prior connection of the power supply line (orange) must continue to exist.

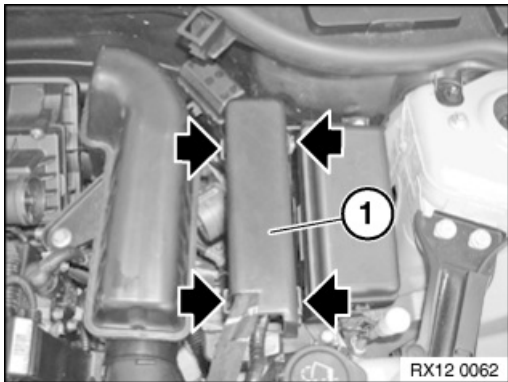
Crimp pin 1 (red) of the additional wiring harness onto pin 17 of 53-pin control unit connector X60231 (1) on engine wiring harness.

To do so, first disconnect the cable from the engine wiring harness (orange) and then reconnect. While doing so, also connect the cable from the additional wiring harness (red). You now have a 3-cable connection here.

Connect **pin 2 (white)** onto chamber K2 of 48-pin control unit connector X60232 (3). The original signal line is no longer needed and can be tied back.

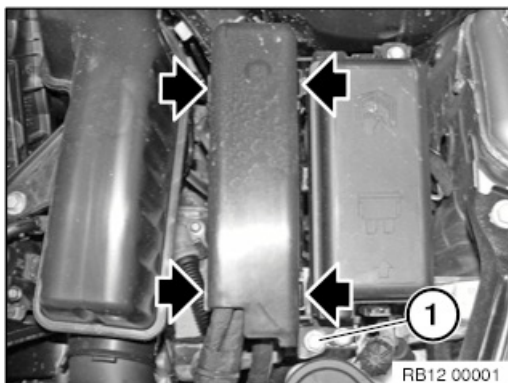
Note:

Set cable connector in marked area (4).



Version 1:

Install and lock cover (1).



Version 2:

Install and lock cover.

Tighten bolt (1).



Required follow-up work:

- Connect battery earth lead
- Install intake silencer housing



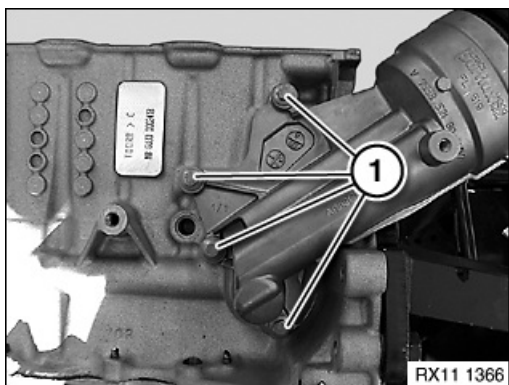
**Warning!**

Risk of scalding!

Only perform this repair work on an engine that has cooled down.

*Necessary preliminary work:*

- Unfasten oil filter cover.
- Remove the catalytic converter.

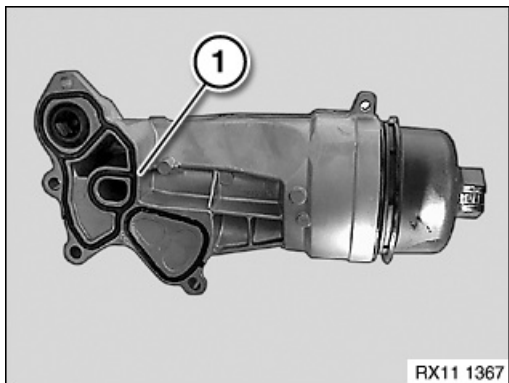


Release screws (1).

Tightening torque: 11 42 2AZ.

Note:

Pictures show N12.



Replace gaskets (1).



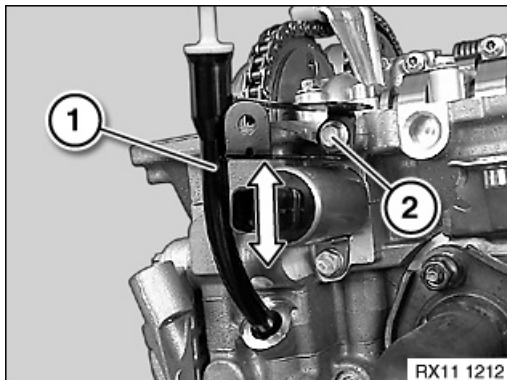
Assemble engine.





Necessary preliminary work:

- Pull dipstick out of guide tube.



Release screw (2).

Tightening torque: 11 43 1AZ.

Remove oil dipstick (1) upward in direction of arrow.

Installation note:

Replace O-ring.



Assemble engine.

Check oil level, correcting if necessary.



**Warning!**

Risk of scalding!

Only perform these tasks on an engine that has cooled down.

**Recycling:**

Catch and dispose of drained coolant.

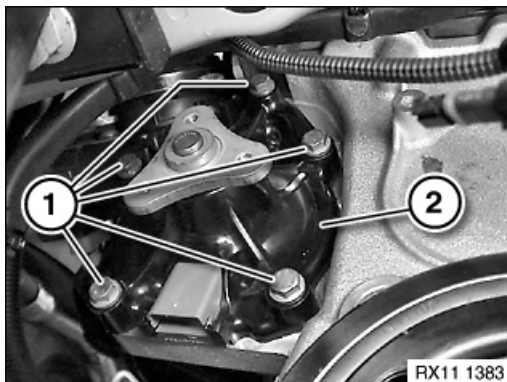
Observe country-specific waste disposal regulations.

**Installation note:**

1. All screws, nuts, bolts and hose clamps removed during the repair must be replaced.
2. Retaining elements on chassis and suspension and steering parts must be replaced.

**Necessary preliminary tasks:**

- Remove friction gear.



Release screws (1).

Remove coolant pump (2) downwards.

Installation note:

Replace gasket.

Clean sealing surfaces.



Assemble engine.

Bleeding instructions must be observed without fail.



**Special tools required:**

- 17 2 050

**Warning!**

Risk of scalding!

Only perform these tasks on an engine that has cooled down.

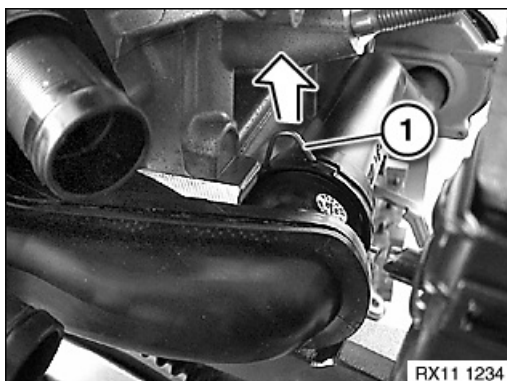
**Recycling:**

Catch and dispose of drained coolant.

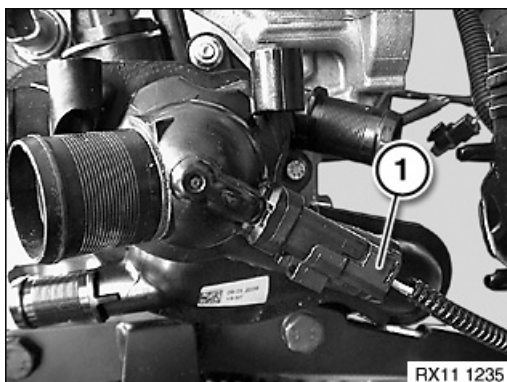
Observe country-specific waste disposal regulations.

**Necessary preliminary tasks:**

- Drain coolant from radiator.
- Remove intake pipe.

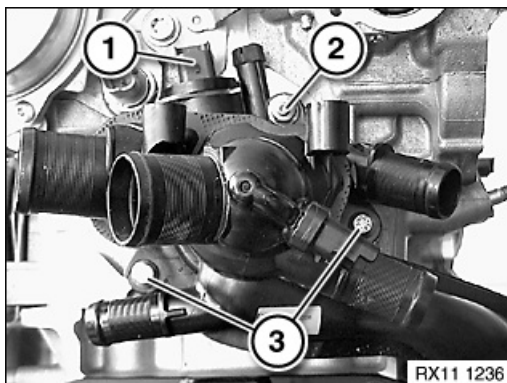


Release lock (1) on coolant pipe in direction of arrow.



Disconnect plug connection (1) on coolant thermostat.





Detach all coolant hoses from thermostat.

Note:

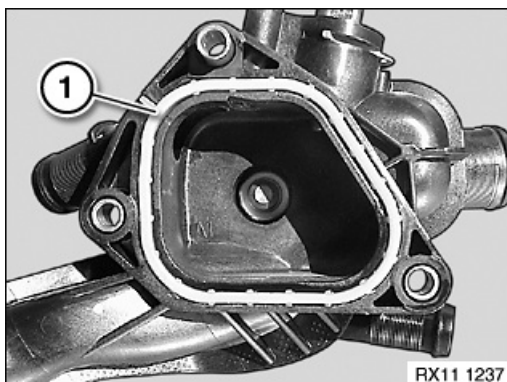
- Release metal hose clamps with special tool 17 2 050 .

Unfasten screws (2 and 3).

Tightening torque: 11 53 1AZ.

Note:

Pictures show N12.



Installation note:

Replace gasket (1).



Assemble engine.

Vent cooling system and check for leaks.





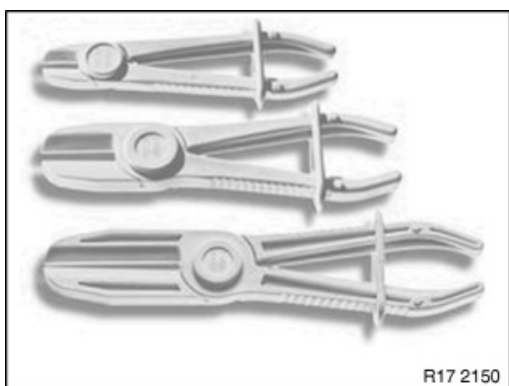
Special tools required:

- 17 2 052



Necessary preliminary work:

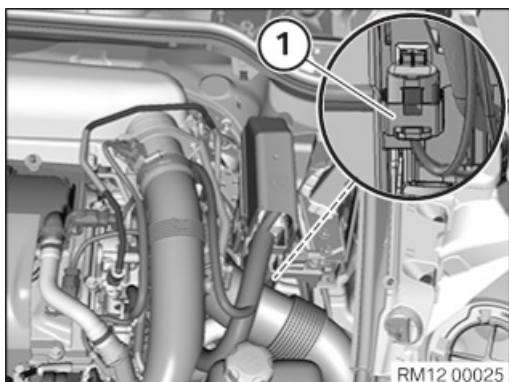
- Remove fan cowl with electric fan.
- Drain coolant.
- Remove left charge air hose.



Note:

To disconnect coolant hoses, use commercially available disconnect tools such as HAZET brand tools (see table).

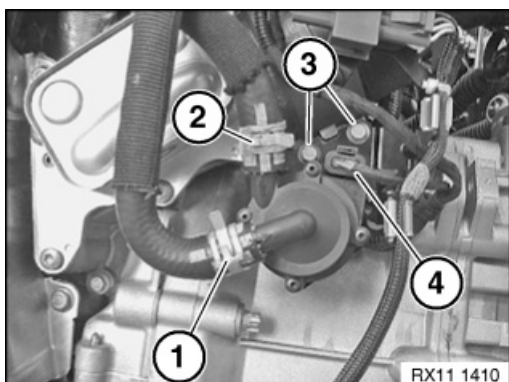
HAZET no.:	Description
4590-1	Length of disconnect pliers (mm): 150
4590-2	Length of disconnect pliers (mm): 180
4590-3	Length of disconnect pliers (mm): 253
4590 / 2	Disconnect pliers set
4590 / 3	Disconnect pliers set



Attention!

Taking into account for troubleshooting!

In some vehicles, an additional fuse (1) for the auxiliary coolant pump is installed in the vicinity of the DME control unit.



Clamp off coolant hoses

Release hose clip (1 and 2) with special tool 17 2 052 .

Release coolant hoses from auxiliary coolant pump.

Disconnect plug connection (4).

Loosen screws (3).

Tightening torque: 11 53 3AZ.





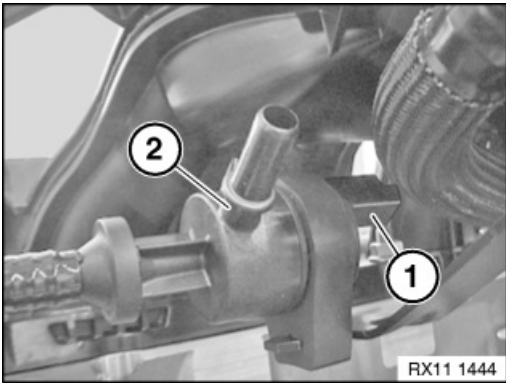
Vent cooling system.
Assemble engine.



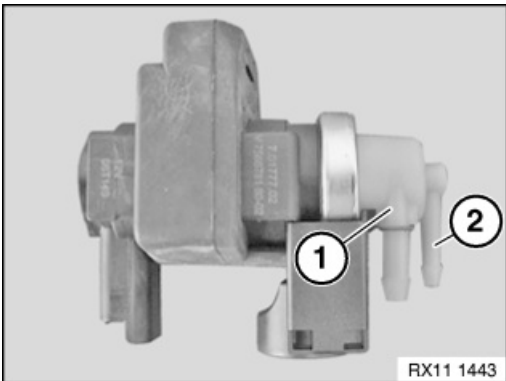


Necessary preliminary tasks:

- Disconnect battery earth lead.
- Remove intake silencer housing.
- Release pressure hose on throttle body.



Disconnect plug connection (1) on tank vent valve (2).
Detach hose from tank vent valve (2).



Note:

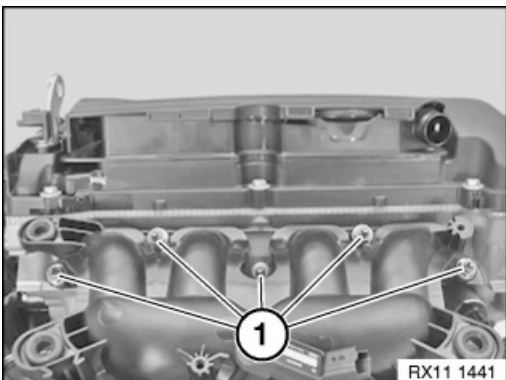
Graphic shows removed pressure converter (EPDW).

Disconnect vacuum lines on vacuum connection (1 and 2).

Disconnect plug connection on pressure converter (EPDW).

Installation note:

OUT connector (1) is identified with a green ring.



Release support bracket below plenum.

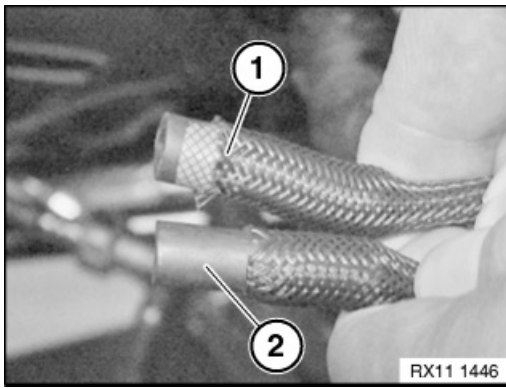
Unscrew nuts (1).

Tightening torque: 11 61 1AZ.

Raise intake plenum off of the stud bolt to the point where the plug connection on the throttle body is accessible.

Unlock plug connection on throttle body and disconnect.





Installation note:

OUT connector (EPDW) on the pressure converter is identified with a green ring.

Vacuum line (1) is fitted with a green ring (OUT).

Vacuum line (2) without green ring (VAC).



Installation note:

Replace all gaskets.

- Convert throttle body.

Assemble engine.

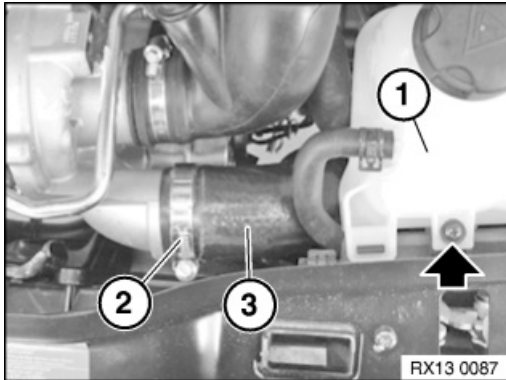


**Important!**

Charge air hoses with clamp fastenings must be installed dry and free from grease!

Sealing surfaces and connecting branches must be dry and free from grease.

If gaiter and charge air hoses with clamp fastenings are not installed dry and free from grease, this may result in exhaust turbocharger failure.



Release screw on expansion tank (1).

Feed out expansion tank (1) and set aside (do not remove).

Installation note:

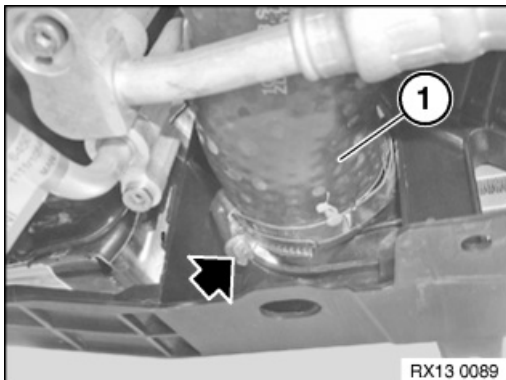
Make sure bearing journal is installed in correct position on rubber mount.

Release clamp (2) and detach charge air duct (3).

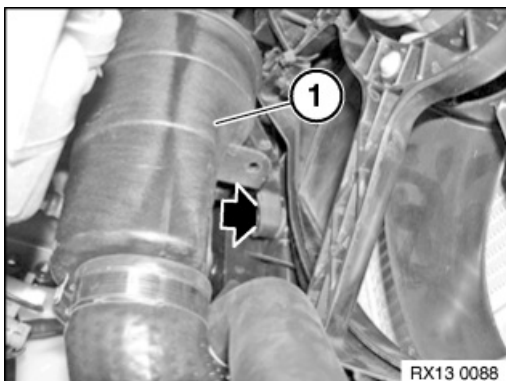
Installation note:

Install charge air duct (3) dry and free from grease.

Connecting branch on exhaust turbocharger must be dry and free from grease.



Release the clamp and detach the charge air duct (1).



Remove charge air duct (1).

At pressure pipe (1), release screw on fan cowl.

Unclip coolant hose on holder.





Note:

Reassemble the vehicle.

Check function of DME.



**Necessary preliminary tasks:**

- Remove right headlight

**Important!**

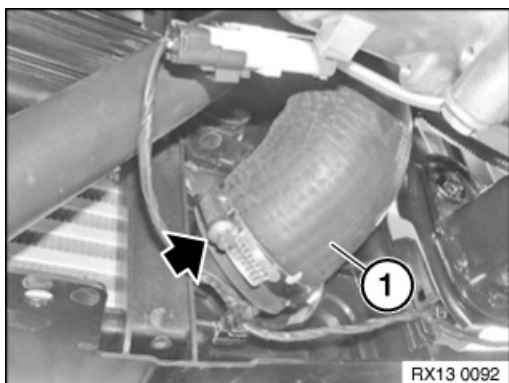
Gaiter and charge air hoses with clamp fastenings must be installed dry and free from grease!

Sealing surfaces and connecting branches must be dry and free from grease.

If gaiter and charge air hoses with clamp fastenings are not installed dry and free from grease, this may result in turbocharger failure!

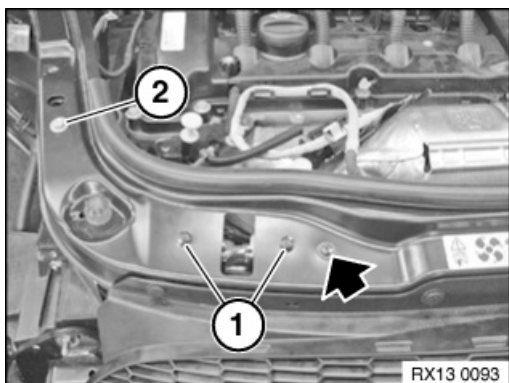


Release screw at fan cowl.



Release clamp and detach charge air hose (1). *Installation note:* Install charge air hose (1) dry and free from grease.

Connecting branch on charge air cooler must be dry and free from grease.

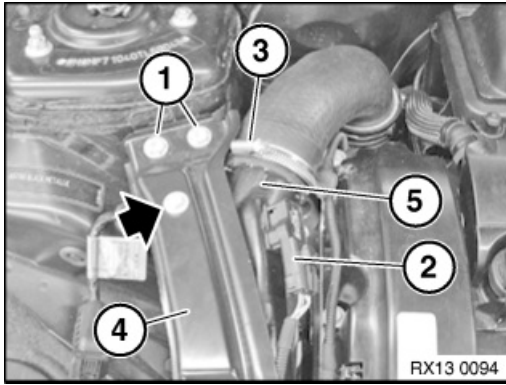


Release screws (1).

Tightening torque 51 23 3AZ.

Release screw (2).





Release screw.

Release screws (1).

Tightening torque 51 11 7AZ.

Disconnect plug connection (2) at charging pressure sensor.

Release clamp (3).

Raise lock carrier (4) slightly.

Detach charge air duct (5) from hose and remove.

Installation note:

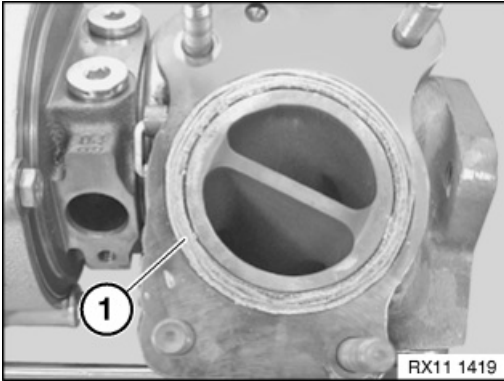
Fit charge air hose dry and without grease.





Necessary preliminary tasks:

- Remove exhaust manifold



Installation note:

The following components must be checked before installation of the exhaust turbocharger:

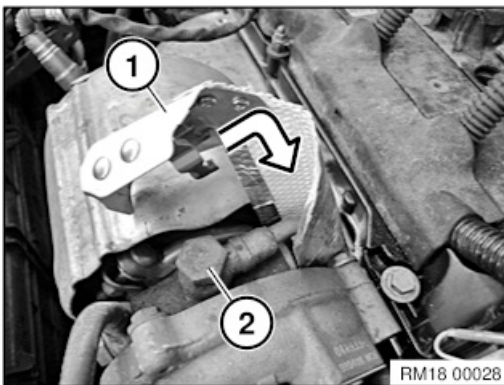
Engine oil and coolant and screw connection: Check supply and return lines for dirt contamination and obstructions. Clean and replace if necessary.

Check air filter for dirt contamination (particles) and replace if necessary.

In the case of heavy dirt contamination on supply and return lines it is recommended to change the engine oil with oil filter.

Check correct functioning of crankcase ventilation.

Replace all gaskets.

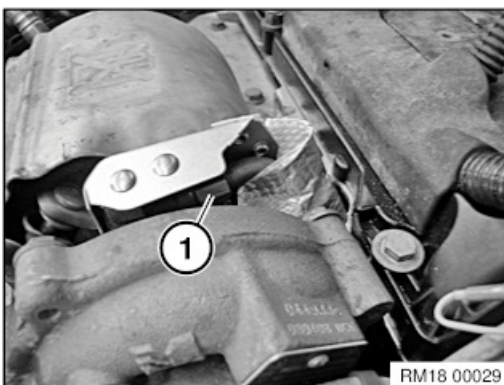


Installation note:

When fitting engine oil pipe and banjo bolt, install thermal protection (1) (see Electronic Parts Catalogue).

Wrap thermal protection around engine oil pipe.

Check banjo bolt (2) and engine oil pipe for blockage. Replace blocked banjo bolt and engine oil pipe.



Installation note:

Make sure that thermal protection clamp (1) engages correctly.



Assemble engine.



**Special tools required:**

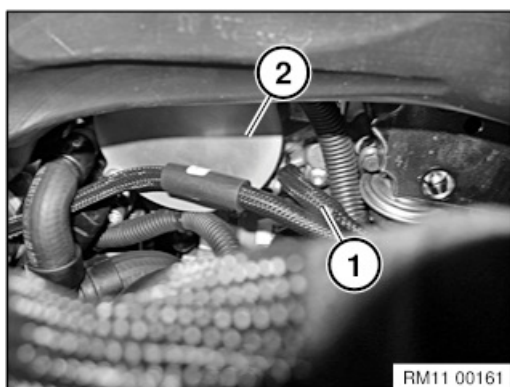
- 81 31 2 357 800

**Caution!**

Note the sequence of the diagnosis instructions in the **ISID**:

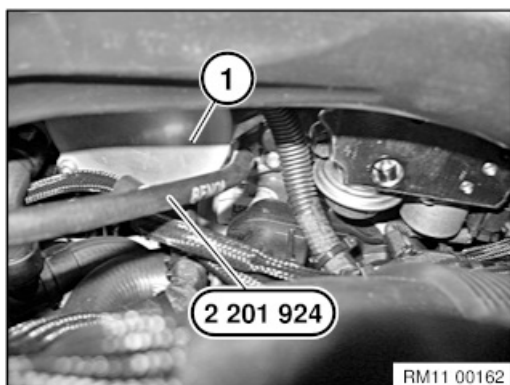
Depending on the fault pattern, the order of operations in the repair instructions may be different from the order of operations in the **ISID**.

Carry out procedure to check the vacuum system.

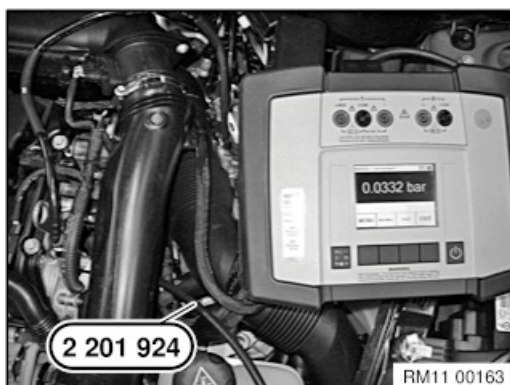
**Check suction effect of vacuum pump.**

Pull vacuum line (1) off vacuum pump (2).

Follow diagnosis instruction.



Connect special tool 81 31 2 357 800 (previously: 81 38 2 201 924 to vacuum pump (1).

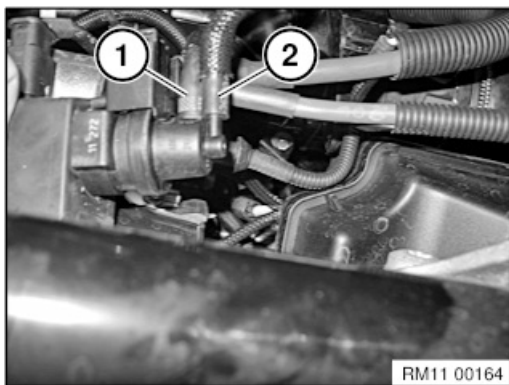
**Check suction effect of vacuum pump.**

Follow diagnosis instruction.

Note:

When the **IMIB** is used the absolute pressure is displayed.





Check vacuum reservoir.

Detach pressure converter from bracket.

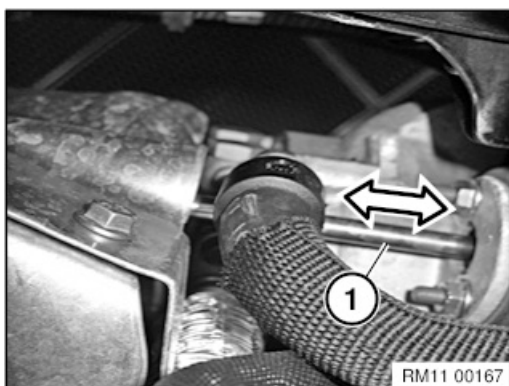
Pull off vacuum line (2) from pressure converter.

Follow diagnosis instruction.



Connect vacuum line (1) with special tool 81 31 2 357 800 (previously: 81 38 2 201 924).

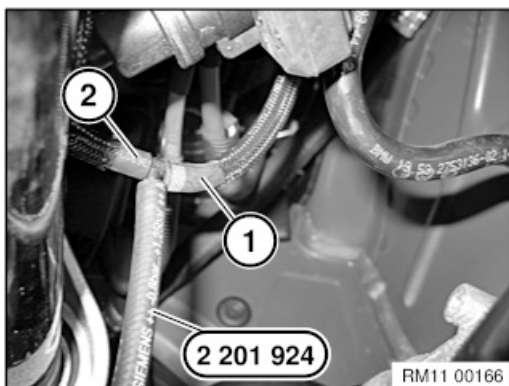
Follow diagnosis instruction.



Check the function of the vacuum unit for the wastegate valve.

Observe movement of wastegate linkage (1).

Follow diagnosis instruction.



Leakage test of the hoses to the vacuum unit for the wastegate valve.

Pull vacuum line (1) off pressure converter plug connection (OUT).

Pull off vacuum line (2) from pressure converter plug connection (VAC).

Connect both vacuum line (1) and special tool 81 31 2 357 800 (previously: 81 38 2 201 924) with a T-piece.

Follow diagnosis instruction.

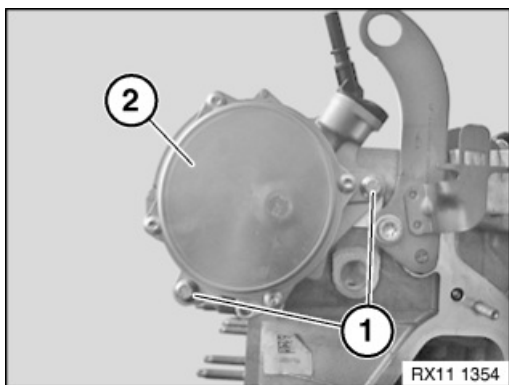


Note:

Remove all special tools.

Reassemble the vehicle.





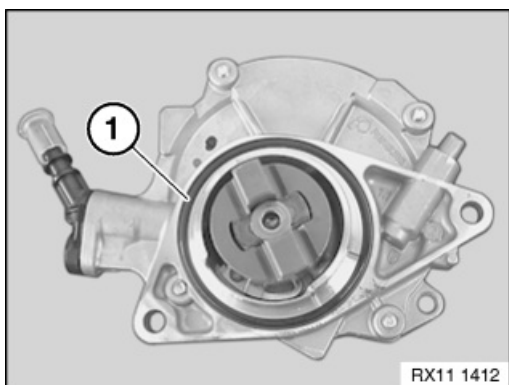
Release vacuum connection to brake servo.

Pull off vacuum control for the exhaust turbocharger.

Release screws (1).

Tightening torque: 11 66 1AZ.

Remove vacuum pump.



Installation note:

Replace sealing ring (1).



Assemble engine.

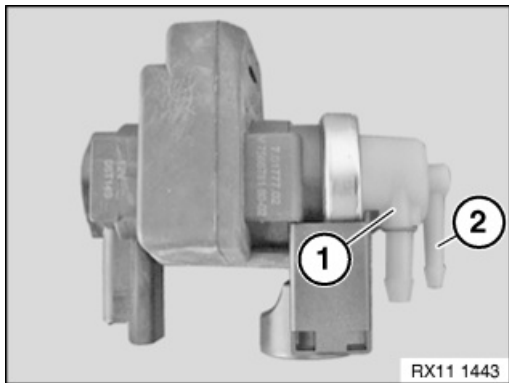


11 74 508 Removing and installing/replacing pressure converter for exhaust turbocharger (N18)



Necessary preliminary work:

- Remove intake silencer housing.



Note:

Pressure converter is installed under intake plenum.

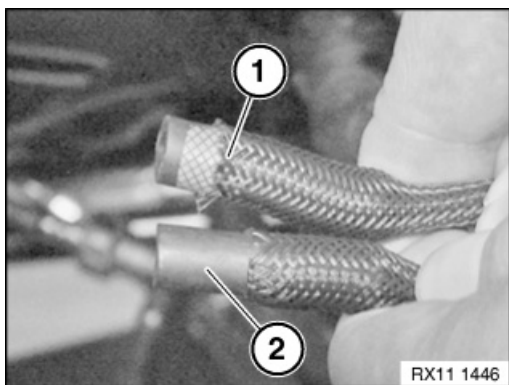
Graphic shows removed pressure converter (EPDW).

Disconnect vacuum lines on vacuum connection (1 and 2).

Disconnect plug connection on pressure converter (EPDW).

Installation note:

OUT connector (1) is identified with a green ring.



Installation note:

Vacuum line (1) is fitted with a green ring (OUT).

Vacuum line (2) without green ring (VAC).



**Special tools required:**

- 11 7 020

**Warning!**

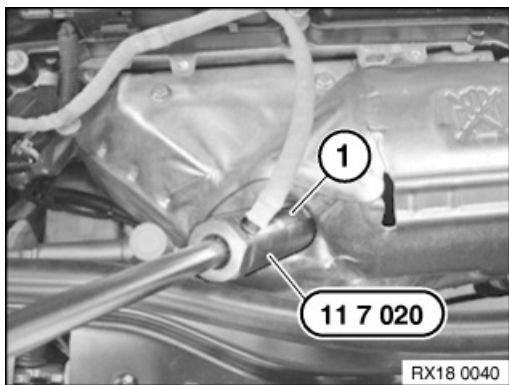
Risk of burning!

Only perform these tasks after the exhaust system has cooled down.

**Installation note:**

If an oxygen sensor is reused, thinly and evenly coat only the thread with NEVER-SEEZ compound Overview of consumables 4.3.

The part of the oxygen control sensor which projects into the exhaust branch (sensor ceramic) must not be cleaned or come into contact with lubricant.



Disconnect plug connection for control sensor.

Release oxygen sensor (1) with special tool 11 7 020 .

Tightening torque 11 78 1AZ.



Assemble engine.

Check function of DME.



**Special tools required:**

- 11 7 020

**Warning!**

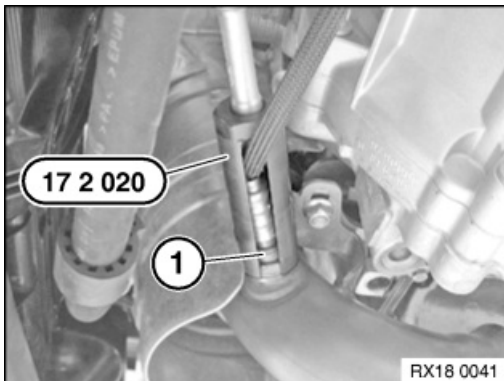
Risk of burning!

Only perform these tasks after the exhaust system has cooled down.

**Installation note:**

If an oxygen sensor is reused, thinly and evenly coat only the thread with NEVER-SEEZ compound Overview of consumables 4.3.

The part of the oxygen monitoring sensor which projects into the exhaust branch (sensor ceramic) must not be cleaned or come into contact with lubricant.



Disconnect plug connection of monitoring sensor.

Release monitoring sensor (1) with special tool 11 7 020 .

Tightening torque 11 78 1AZ.



Assemble engine.

Make sure that the cable routing is correct.

Check function of DME.



00 11 500 Checking/topping up oil level in automatic transmission (AISIN)N18 N16



Special tools required:

- 24 4 240



Important!

Use only the approved automatic transmission oil in this automatic transmission.

Failure to comply with this requirement will result in serious damage to the automatic transmission!

Installation note:

Details of approved oil grade:

refer also to adhesive label on transmission oil sump.



Note:

Level out oil level in automatic transmission via overflow connector.



Necessary preliminary tasks:

Remove underbody protection.

On vehicles with hydraulic steering gear:

Remove heat shield from hydraulic steering gear.

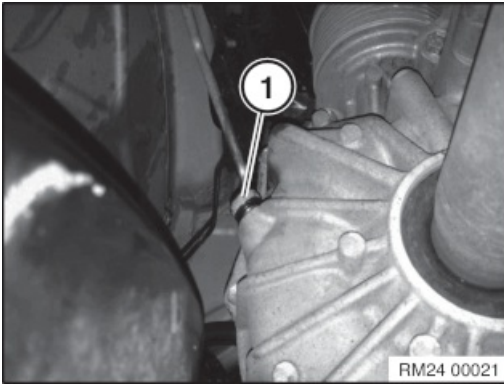
Tightening torque 32 41 12AZ.



Note:

Special tool 24 4 240 must be shortened to overall length of 36 mm.





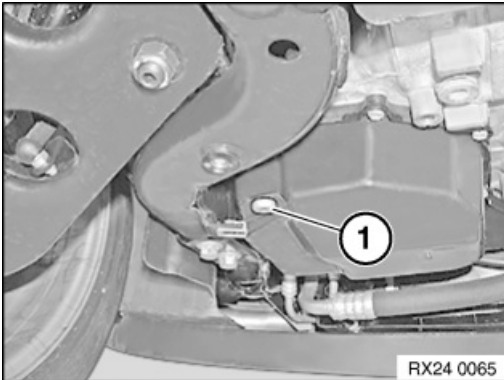
Move selector lever to "P" position.

The vehicle must be horizontal and secured against rolling off.

Connect BMW diagnosis system.

Release oil filler plug (1) using special tool 24 4 240 .

Tightening torque 24 11 2AZ.



Top up transmission oil. (Transmission oil has been drained)

Remove M10 oil drain plug (1) from transmission oil sump.

Tightening torque 24 11 1AZ.

Pour in automatic transmission fluid through oil filler plug until oil emerges at oil drain plug.

Start engine and run at idle speed.

Check whether ATF emerges at M10 oil drain plug.

If not, continue to add ATF.

Actuate footbrake and at idle shift through all gears "P" to "D" twice for more than 2 seconds.

Then move switch to "P" position.

Again check whether ATF emerges at M10 oil drain plug.

Check the temperature of the automatic transmission fluid with the BMW Diagnosis System.

Increase temperature of automatic transmission fluid to 35 ... 45 °C.

Top up automatic transmission fluid until it flows over.

Screw in oil filler plug and oil drain plug.

Tightening torque 24 11 1/2AZ.

Installation note:

Replace sealing rings.

Check oil level (oil temperature must be between 35 and 45 °C):

Open oil filler plug.

Slacken oil drain plug (1).

Tightening torque 24 11 1/2AZ.

Start engine and run at idle speed.

Unscrew oil drain plug.

Check whether ATF emerges at oil drain plug (1).

If not, pour in ATF up to oil filler plug.

Top up automatic transmission fluid until it overflows at oil drain plug.

Actuate footbrake and at idle shift through all gears "P" to "D" twice for more than 2 seconds.

Move switch to "P" position.

Check oil level again.

Seal screws when the oil emerges slightly from the drain plug.

Tightening torque 24 11 1/2AZ.



11 Equipment recoding special tool number of the transverse member for fixing the engine in the installation location

Equipment recoding from 00 0 200 to 00 6 0 000

Designation	Special tool new	Special tool previous
Cross-member, previous	---	00 0 200
Cross-member, new	00 6 000	---
Mounting bridge	00 6 001	00 0 201
Spindle with hook	00 6 002	00 0 202
Extension	00 6 003	00 0 203
Adapter support	00 6 004	00 0 204
Extension	00 6 005	00 0 205
Chain with hook	00 6 006	00 0 209
Set of supports	00 6 010	00 0 206
Set of supports	00 6 020	00 0 207
Set of supports	00 6 030	00 0 208
Connector	00 6 031	---
Profile strip (2 x)	00 6 032	---
Supports (4 x)	00 6 033	---
Set of supports	00 6 040	---
Profile strip	00 6 041	00 0 451
Supports (2 x)	00 6 042	00 0 452
Supports, short (2 x)	00 6 043	---
Set of supports	00 6 050	---
Profile strip (2 x)	00 6 051	---
Supports, short (2 x)	00 6 052	---
Supports, long (2 x)	00 6 053	---
Support, long	00 6 060	---
Supports (2 x)	00 6 070	---



61 20 ... Battery replacement information

A vehicle battery is constructed for the installation location and the individual power requirements of the particular vehicle. These individual power requirements depend on the motorisation and different types of optional equipment. The individually assigned vehicle battery is the ideal compromise between the power requirements of the vehicle electrical system and the weight and service life of the vehicle battery.

If the vehicle electrical system of electric vehicles is not accessible due to a faulty 12 V battery, proceed as follows:

Battery exchange in electrified vehicles

Vehicles with the automatic engine start-stop function or particular engine types and optional equipment are equipped with a special vehicle battery (AGM battery), since only this battery type can provide elevated power requirements over the extended service life. Installing a different vehicle battery can cause problems with vehicle electronics, can reduce functions or can cause leakage of battery acid.

In the event of an accident where the airbags are deployed in vehicles with a vehicle battery in the luggage compartment, the electrical connection between the vehicle battery and the trigger is automatically disconnected through pyrotechnics. This prevents possible short-circuiting.

Proper operation of all of these safety and convenience functions requires a battery that conforms with specifications and that is properly registered in vehicles with energy management systems (IBS, power module).

Vehicles with energy management systems (IBS, power module): Register battery exchange.

The vehicle electrical system is informed about the vehicle battery characteristic data, such as type, size, age and current power capacity. Therefore, there will always be only one work scope provided that is permitted by the current status of information.

When installing a new vehicle battery, the battery must be registered and thus must also be registered with the vehicle electrical system.

Diagnosis system:

Register battery exchange.

- Service functions
- Body
- Voltage supply
- Register battery exchange

When retrofitting, a more powerful battery may be used. Standard batteries may always be replaced by AGM batteries with the same specifications.

When installing a battery of a different size or a different battery type, this change in vehicle data must be programmed into the vehicle data in accordance with specifications.

Programming system:

- Battery retrofitting



61 13 ... Butt connector for repairing a plug connection



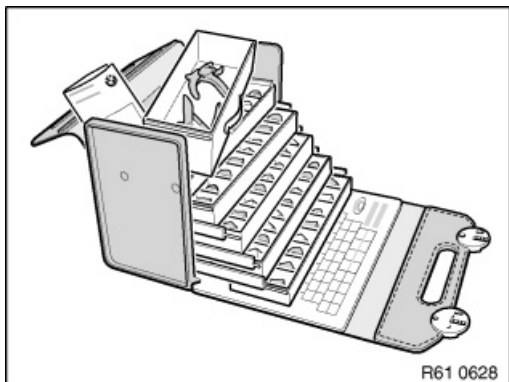
Special tools required:

- 61 0 300
- 61 4 340
- 61 0 240



Important!

1. Identify cause of damage (e.g. sharp-edged body components, faulty electrical loads, jammed mechanisms, corrosion caused by ingress of water, etc.).
2. Read out fault memory
3. Eliminate cause of damage.
4. Disconnect battery negative terminal
5. Make sure that no safety-related system according to circuit diagram (e.g. antilock braking system, active rear-axle kinematics, airbags, etc.) are influenced. Otherwise replace faulty wiring harness or use repair cable (sourcing reference: BMW Parts Department)
6. Carry out function test and read out fault memories again
7. Eliminate new faults if applicable and clear fault memories

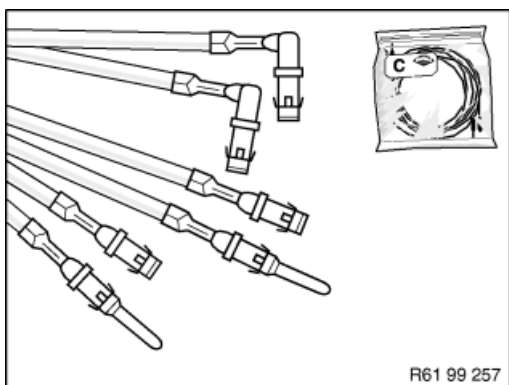


Note:

The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.

The case can no longer be ordered. Order individual parts for wiring harness repair through BMW Parts Department.

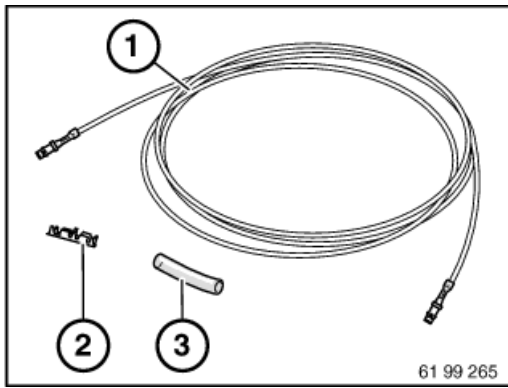
- Refer to Service Information:
SI 02 04 07 341



Choose repair kit.

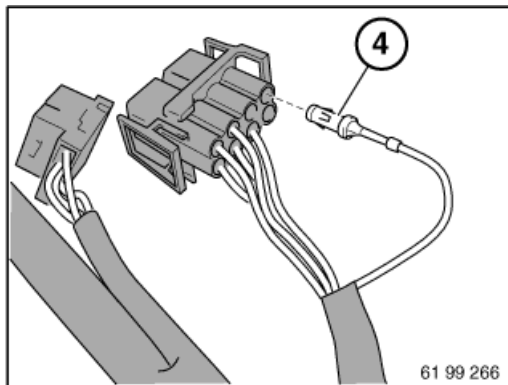
Example: Repair kit, circular connector system D 2.5.





Remove following parts:

- (1) Pre-packaged end of cable with requisite wire cross-section
- (2) Crimp connector for selected wire cross-section
- (3) Shrink-fit hose

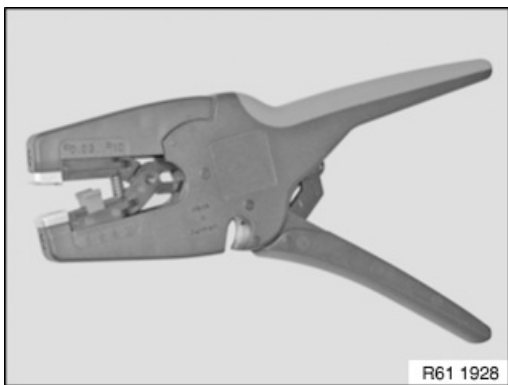


Open secondary lock on housing.

Mark damaged contact (4) with socket number of housing and press it out of housing using appropriate special tool contained in special tool set 61 0 300).

See repair instructions

Notes for opening contacts and locks of different plug contact systems.



Important!

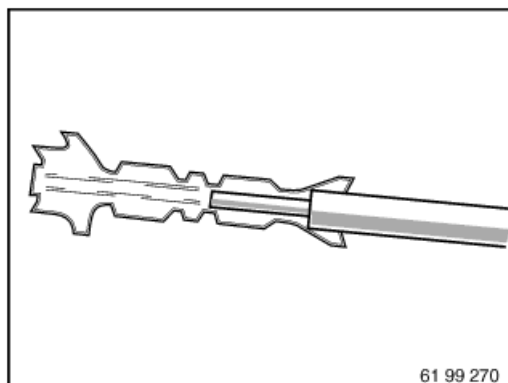
- Check maximum length of repair cable
- If more than one wire is to be repaired, the individual interfaces must be offset so that the wiring harness is not too thick at the repaired point.

Adhere to following procedure:

- Cut off wire with faulty contact at point which is easily accessible
- Strip insulation from end of wire at wiring harness end
- Cut preassembled wire end to length and strip insulation

Refer also to repair instruction:

Cutting to length and stripping insulation from cables



Crimp butt connector on preassembled wire end.

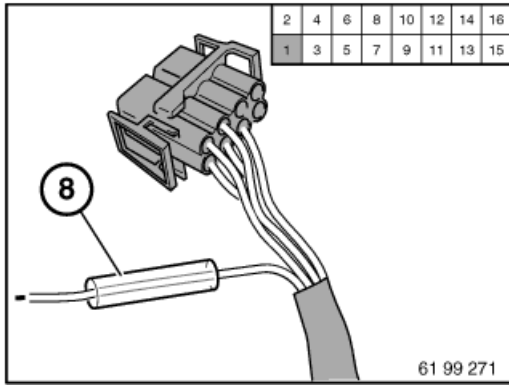
Special tools:

- 61 4 340 (0.35 - 2.5 sq mm)
- 61 0 240 (4.0 - 6.0 sq mm)

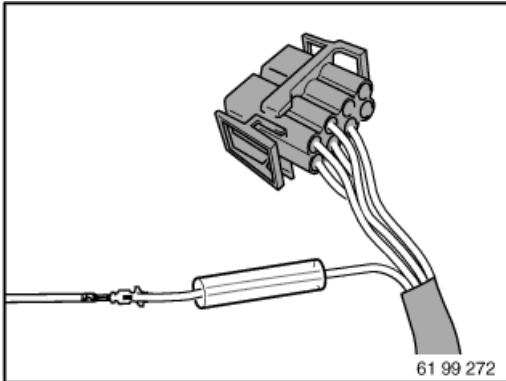
See repair instructions

Crimping on stop parts

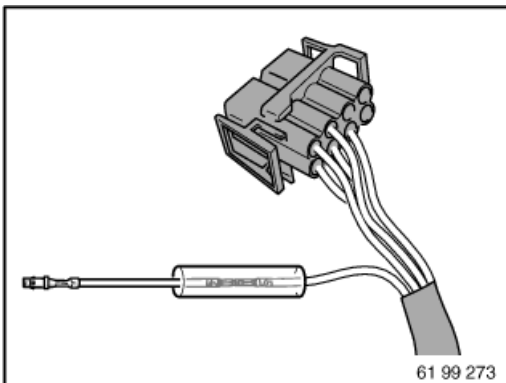




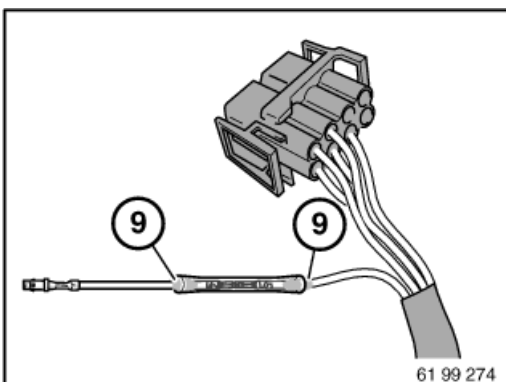
Push shrink-fit hose (8) onto free wire end.



Crimp unused wire end to butt connector.



Pull shrink-on sleeve over butt connector.



Important!

Do not burn shrink-on sleeve.

With hot air blower, shrink the shrink-on sleeve on both sides (9) of shrink-fit hose until glue emerges uniformly all round.

Insert contact in housing.

Close secondary lock on housing.



12 00 **Contents of the motor electronics, general**

- General notes
- > Working on the ignition system
 - > Removing and installing electronic control units
 - > Welding work (overload protection of control units)
 - > Disconnect and connect battery.
 - > Disconnecting and connecting test devices
 - > Component test
 - > External jump-starting aid
 - > Compression test



11 00 ... **Handling components after flood damage**

Flood damage can occur if the permissible fording depth of a vehicle is exceeded. Ingress of water can cause damage to the engine (water shock) or components.

Because dirt particles generally enter into the component with the water (e.g. starter motor, wiring harness), the components need to be thoroughly inspected.

Residual moisture in the components leads to corrosion (increased contact resistance in the component), which can lead to a component failure at a later time.

If water ingress into the electrical components cannot be ruled out, it is recommended to replace the component to ensure correct functioning through the vehicle lifetime.



12 00 ... Instructions for removal and replacement of control units

Important!

- Disconnecting the vehicle battery will cancel the fault memories of control units. Consequently, before disconnecting the car's battery, always interrogate the fault memories. Investigate stored faults and, once any faults have been remedied, cancel the fault memory.
- Control unit plugs should only ever be connected and disconnected while the ignition is turned off.
- The removal and installation of components, relays, fuses etc. can cause faults to be stored in fault memories capable of self diagnosis. Always interrogate the fault memories after completing work on the electrical system.
- Investigate stored faults and, once any faults have been remedied, cancel the fault memory.
- If necessary, initialise power window regulator

On replacement of the DME/DDE control unit note the following:

- In every case use the diagnosis system to read out the hardware/software version of the corresponding control unit.
Comply with the diagnosis system instructions for the encoding and programming work operations.
On vehicles with an electronic immobiliser, comply with the diagnosis system instructions.
- In every control unit certain mean values are stored that are the basic values. The control unit receives different input values according to the engine condition. The teachable system compares the input values against the stored basic values and then forms the associated control commands. The control commands are forwarded to the corresponding actuators.
- When the DME control unit is de-energized for a long period (over one hour), the teachable system then loses the stored values. When a deleted control unit is returned to service or a new control unit is installed, the teachable system itself must read in and store the input value of the associated engine as new basic values.
- This process may cause uneven idle and faults in coasting mode after starting. Depending on the engine characteristics, it may take some time until all values have been compared with the engine condition.
- Therefore, comply with the following procedure before replacement or reinstallation of a DME/ DDE control unit is carried out:
 1. If possible, bring the engine up to its operating temperature prior to replacement of the control unit.
 2. Change control units and drive the vehicle with changing engine speeds.



12 00 ... Instructions for working on the ignition system

Caution!

Always switch off ignition before working on ignition system.

Use only test leads which have been approved and belong to these testing instruments (e.g. DIS Tester).

Comply with operating instructions of the respective testing instrument used.

Comply with the country-specific safety regulations.

Never touch components under current with engine running!

Comply with instructions of DIS tester.

Do not connect any suppression capacitors or inspection lamps to terminal 1 on the ignition coil.

Terminal 1 of ignition coil must not be connected to ground or battery positive lead.

If an alarm system is subsequently installed, lead of terminal 1 must not be used for start prevention.

When working on ignition system, always disconnect supply leads to ignition coils.

High tension! - High tension! Important!

Hazardous voltages occur at:

- Ignition lead
- spark-plug connectors
- spark plugs
- Ignition coil (high voltage at terminal 4 is approx. 40 kV)
- Lead of terminal 1 from ignition coil to DME control unit (high voltage approx. 350 V)



12 00 ... Notes for disconnecting and connecting battery

Observe safety informations for handling vehicle battery.

Before disconnecting battery:

Turn off the ignition and other electrical loads/consumers to prevent sparking when reconnecting.

Note:

If the ignition is not turned off when the battery is disconnected, fault memories may be set in some control units.

Attention!

- There is a danger of mixing up battery cables: If the positive battery cables and negative battery cables are the same colour and you are in doubt, follow the polarity to the battery, then mark and cover the wires.
- On vehicles with radio code: After disconnecting the battery, the radio code must be re-entered. Therefore obtain the radio code card from the customer beforehand. Note stored stations and restore them after connecting the battery.
- Stored settings of the on-board computer and clock will also be lost.
- All available ignition keys with infrared transmitter must be recoded for vehicles with first generation infrared central locking.

General notes on disconnecting battery:

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- On vehicles with IBS at negative battery terminal:
Do not under any circumstances pull/lever off pole shoes by force.
Do not under any circumstances release the hexagon socket screw of the IBS.
- Detach the terminal of the battery earth lead from the vehicle battery and the auxiliary battery if available. Cover battery negative terminal(s) and secure.
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the battery is connected.
- When installing battery terminal: Tightening torque 61 21 1AZ.

After connecting battery:

Attention!

The scope of application of some systems may be restricted after an open circuit.

Likewise, individual settings may be lost.

Settings or activations must be carried out, depending on the equipment specification.

For example:

- Vehicles with automatic engine start-stop function (MSA):
MSA function is active only after teach-in time (vehicle must not be woken for a period of approx. 6 hours) > if necessary, notify customer of the situation
- E46 (all-wheel drive vehicle) / E53 / E83: Carry out steering angle sensor adjustment
- Activate slide/tilt sunroof, if necessary
- If necessary, activate power windows
- If necessary, activate mirror with compass
- Only E60, E61, E63, E64, E70, E71, E90, E91, E92, E93: mount steering angle

Vehicles with a two-battery system

Starter and system battery



A circuit for the starter battery and a circuit for the system battery are part of a two-battery system. An auxiliary control unit monitors both circuits. Depending on the situation, the circuits are connected to or isolated from the auxiliary control unit via a cut-off relay.

Two AGM batteries, whose design and properties are described in AGM batteries, are used as a storage battery.

Attention!

These batteries must not under any circumstances be charged with a voltage in excess of 14.8 V. Rapid programs must not be used either.

Receiving/giving starting aid via jump start terminal point

The engine can be jump-started with an external voltage supply via the jump start terminal on the right side of the engine compartment.

Note:

The starter battery is isolated from the alternators when the bonnet is open.

Giving starting aid via the jump start terminal point is thus limited by the capacity of the starter battery when bonnet is open.

Charging starter and system batteries via jump start terminal point

The starter battery is charged as a matter of priority with a charger connected to the jump start terminal. The voltage at the starter battery is the decisive factor in determining whether the system battery is also included in the charging operation. The auxiliary control unit automatically detects a charging operation at a charging voltage at the starter battery of ≥ 13.5 V. The cut-off relay is closed and thus the system battery is connected in parallel. Both batteries are now charged.

Prerequisite:

- Terminal 61 inactive
- Terminal 15 inactive

If terminal 15 becomes "active" during the charging procedure, the cut-off relay is opened immediately and again only the starter battery is charged.

Note:

When the bonnet is open, the cut-off relay is also opened in normal operation when the engine is running.

A special mode can be set by means of diagnosis for workshop/garage operation. The cut-off relay is closed from terminal R in this operating mode. This mode is automatically reset once a distance of 5 km has been driven.

Trickle charging

The increased standby current consumption can be compensated for via the jump start terminal point with the aid of the "Acctiva easy" trickle charger (Service Information 2 03 05 205).

Attention!

The cigarette lighter is isolated from the electrical system after terminal R "OFF" on a timed basis (60 mins.), thereby interrupting charging of the system battery via the cigarette lighter. This is prevented if the battery switch (on the right side of the luggage compartment behind the trim panel) is turned on and off again twice within 2 seconds.



61 00 ... Notes for disconnecting and connecting the vehicle battery

Observe safety informations for handling vehicle battery.

Before disconnecting vehicle battery:

Turn off the ignition and other electrical loads/consumers to prevent sparking when reconnecting.

Note:

If the ignition is not switched off when the vehicle battery is disconnected, fault memories may be set in some control units.

Attention!

- There is a danger of mixing up battery cables: if the positive battery cable and battery earth lead are the same colour and you are in doubt, follow the polarity to the vehicle battery, then mark and cover the leads
- The on-board computer and clock may lose your data.

General notes on disconnecting the vehicle battery:

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- Disconnect terminal of battery earth lead from the battery. Cover battery negative terminal(s) and secure.
- Disconnect both battery earth leads in version with auxiliary battery. Cover battery negative terminal(s) and secure.
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the vehicle battery is connected.
- When installing battery terminal: Tightening torque 61 21 1AZ.

Only lead AGM battery:

- On vehicles with IBS at negative battery terminal:
Do not under any circumstances pull/lever off pole shoes by force.
Do not under any circumstances release the hexagon socket screw of the IBS.

Note the following after having connected the vehicle battery:

Attention!

The scope of application of some systems may be restricted after an open circuit.

Personal Profiles may also be lost.

Settings or activations must be carried out, depending on the equipment specification.

For example:

- Activate slide/tilt sunroof, if necessary
- Activate power window, if necessary

Refer to the diagnosis system for further vehicle-specific information.



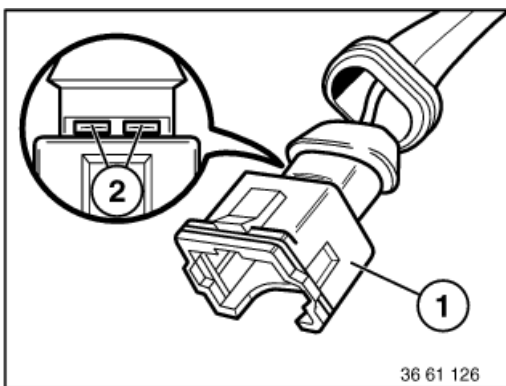


Special tools required:

- 61 0 300
- 61 0 400
- 61 1 100

Abbreviations of contacts and what they mean:

ELA	Strand seal
D 1.5 / 2.5 / 3.5	Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter
MDK	Miniature double flat spring contact
JPT	Junior Power timer
DFK	Double flat spring contacts
Elo	Electronic contacts
Elo Power	Electronic contacts for heavy load
MQS	Micro Quadlock system
MPQ	Micro Power Quadlock
MLK	Mini laminated contact
SLK	Sensor laminated contact
LSK	Load current contact
MLK	Mini laminated contact
Mcon	Multi contact



Important!

The contacts can be changed on ultrasonically welded connectors (1).

Ultrasonically welded connectors (1) must be replaced completely.

Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.



Note:

Special tools referred to in the repair instructions below are contained in the following special tool sets:

- Unlocking and pressing-off tool 61 1 150
is replaced as of 09/2005 by 61 0 300 (BMW) and 61 0 400 (MINI)
- Release and pressing-off tool 61 1 100 (engine)



Repair instructions for opening connector housings and removing contacts of different connector systems:

Connector system D 1.5/D 2.5:

- Circular connectors, 7- or 8-pin, system D 2.5
- Circular connectors, 13-pin, system D 2.5
- Circular connectors, 20-pin, system D 2.5
- Circular connectors, 4-, 7-, 10-, 12- or 25-pin, system D 1.5/D 2.5
- In-line connectors, 15-pin, system D 2.5
- In-line connectors, 8-, 12-pin, system D 2.5
- In-line connectors, 30-pin, system D 2.5
- In-line connectors, 20-pin, system D 2.5

Connector system JPT/MDK/DFK:

- In-line connectors, 2-pin, System JPT ELA
- In-line plugs, 2-pin, System MDK 3 plus 2.8
- In-line plugs, 4-pin, System DFK ELA

Connector system Elo/Elo Power:

- Inline plugs, 4-, 10-pin, System Elo
- In-line connectors, 6- to 50-pin, System Elo
- Inline plugs, 3-, 6-pin, System Elo-Power 2.8

Connector system LSK:

- Connector housing LSK contact

Connector system MQS/MPQ:

- Inline connectors, 6-, 8-pin, System MQS
- Inline plugs, 2-pin, System MPQ 2.8
- Control unit connectors, 25-, 35-, 55-, 83-, 88-pin
- In-line plugs, 24-pin, Hybrid System MQS/MPQ
- Socket housing 42-, 43-pin, Hybrid System MQS / MPQ
- Socket housings 2x21-, 2x27-pin, Hybrid System MQS/MPQ, Elo/Elo Power
- In-line connectors, 30-pin, Hybrid System MQS/MPQ
- Socket housings, 5-, 8-pin, System MQS/MPQ
- Socket housing (radio connector), Hybrid System MQS/MPQ

For connector contact systems not listed, refer to Service Information:

SI 2 05 05 217

SI 2 05 06 294

SI 2 03 08 440

SI 2 08 06 312

SI 2 02 08 439

SI 2 01 08 438







The following applies in general:

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies:

Shielded lines

Interference radiation and interference resistance can lead to neutral zones at contact points in the shielding. Consequently, distinctions have to be drawn between the following types:

Coaxial lines

- Shielded coaxial cables RTK031 may only be repaired with special crimping tool.
- For aerial lines only the bushing contact may be repaired.
- RG174 Lines and the bushing contact may not be repaired.

CVBS lines

- CVBS cables may not be repaired.
- CVBS cables must be replaced in their entirety.

HSD lines

- HSD cables may not be repaired.
- HSD cables must be replaced in their entirety.

Optical fibre cable:

Note:

Fibre-optic cables are coloured differently as follows:

- Green = **MOST** (Media Oriented Systems Transport) optical fibres
- Yellow = **ISIS** (Intelligent Safety and Integration System) optical fibres
- Orange=repair fibre-optic cables

Attention!

- Fibre-optic cables are permitted to show only one junction point (bridge), replace fibre-optic cables if necessary
- Smallest permissible bending radius is 25 mm
- Avoid effects of heat $\geq 85^\circ$

Treating cables and optical fibres

FlexRay (twisted cables)

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

Note:

- FlexRay lines may only reveal one separation point (bridge) per line



- Flexray lines may only reveal one separation point (bridge); renew complete line if necessary.
- If possible, maintain twisted cable after repair.
- After repairs, twist cables as close as possible to the connector/separation point.
- Twisting must be as symmetrical as possible.

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables

Replacing wiring harnesses

Repair wiring harnesses mainly cover the full equipment of the vehicle. If certain optional equipment is not installed in the vehicle, note the following:

- If necessary, secure the remaining connectors.
- If necessary, seal the remaining connectors outside the vehicle interior, for example, with butyl tape in such a way that moisture ingress can be eliminated permanently.

Note:

Repair wiring harnesses can be equipped with an **additional socket housing** (e.g. 30-pin), **which was not provided on the previous vehicle-side wiring harness**. This socket housing also cannot be found in the wiring diagram.

Procedure

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **in the vehicle interior** (in the footwell, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.
- Alternatively, a suitable pin housing can be fitted on the vehicle-side wiring harness and connected to the additional socket housing.

However, this is permitted only if the following conditions are met:

- Carpets must not protrude visibly or become deformed due to the installation of the additional plug connection.
- It must be possible to install the adjacent components (for example, trims, trim panels, etc.) correctly after installing the additional plug connection.
- All the attachment points of the adjacent components (for example, trims, trim panels, etc.) must engage correctly.
- There must be no rattling noise due to the installation of the additional plug connection.
- The additional plug connection must not damage the adjacent components/wiring harnesses, etc..

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **outside the vehicle interior** (in the wheel arch, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.



- **Using the additional socket housing is not permitted with a separation point outside the vehicle interior.**



12 00 ... Notes/information on start assistance (jump starting)

Do not start the engine with help of starting sprays.

Preparation:

Conform with the following when starting the engine with a jump starting cable.

- Ensure that the jump starting cable wires are of appropriate cross-section size.
- Only use fuse-protected jump starting cables.
- Check whether the current-supplying battery has 12 V voltage.
- If the engine is started from the battery of another vehicle, ensure that there is no contact between the bodies of both vehicles.

Important!

Never touch electrically live ignition system components: high voltage - danger of injury!

If the battery in the vehicle supplying power is weak, start the engine of this vehicle and let it run at idling speed.

Operation:

It is essential to conform to the procedures so as to avoid injury to persons or damage to parts.

- Automatic transmission: select drive position "P", apply parking brake.
- Manual transmission: move gear lever to neutral position, apply parking brake.
- Ensure that the jump leads cannot get caught in rotating parts, e.g. fan.
- First connect both positive poles of the batteries with one jump starting cable (red).
- Use the battery positive terminal in the engine compartment for vehicles with the battery in the luggage compartment.
- Then use the second jump starting cable (black) to connect the negative post of the current-supplying battery with the earth/ground point (not the negative pole or the body) of the vehicle to be started.

Important!

Do not connect the second jump starting cable (black) with the negative pole of the battery in the vehicle to be started. Produced gas could be ignited by sparks.

Risk of explosion!

After the engine of the vehicle to be started has fired, first disconnect the jump starting cable between the negative pole and the earth/ground point. Then remove the starting cable from the positive poles.



00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



Warning!

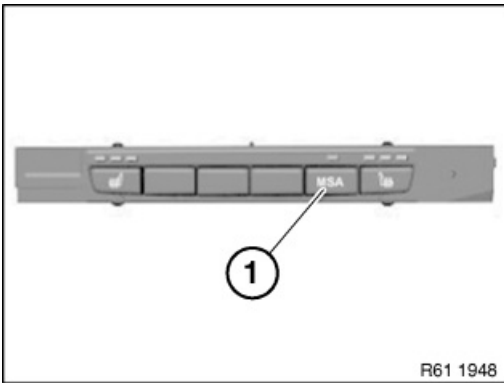
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

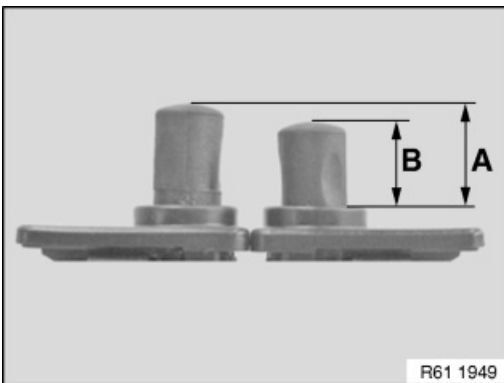
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode
A = 10 mm
 - Basic setting (engine hood/bonnet open)
B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



When working with diagnosis tools:

- Observe instructions in diagnosis tool





Note:

For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) Service Information (bulletin) 61 01 07 335
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) Service Information (bulletin) 61 01 10 629



61 00 ... Safety information on handling hybrid cars

1. Qualification:

All repair work on high-voltage components may **only be performed by specially trained personnel** (qualification: Work on high-voltage inherently safe vehicles) must be performed by qualified technicians. Each hybrid car requires additional vehicle specific training with training achievement controls.

Required training is offered by the BMW Training Academy.

2. Identification:

Observe **warning notices** on high-voltage components. When replacing individual high-voltage components, check if warning stickers are present. Independently attaching warnings is only allowed on the locations provided for them. Use only approved and appropriately identified original new parts.

3. Rules of conduct/protective measures:

- Note operating instructions for handling high-voltage battery units.
- Do not under any circumstances touch open high-voltage cables and high-voltage components on damaged vehicle before shutting down the high-voltage electrical system.
- In the event of damage (mechanical, thermal) transition metal oxides, carbon, electrolyte solvents and their products of decomposition may be released.
Suitable acid-resistant protective clothing/equipment must therefore be used when handling the vehicle!

- Hand protection: Gloves
- Eye protection: Safety goggles

Damaged high-voltage battery units must be stored in an acid-resistant pan in a location in the open that is protected against the weather (sun, rain) and secured against unauthorised access. Do not inhale escaping gasses.

- Prevent escaping substances from entering drains, pits and the sewer system.
- Collect any material that is discharged and have it disposed of according to the work instruction, wear acid-resistant protective clothing when doing so.
- Notify the fire brigade if fire breaks out, clear the area immediately and make accident scene safe. Attempt to extinguish the fire without putting persons in danger (suitable extinguishant: water and water foam).
- A cut 2nd emergency separation point must be repaired with a butt connector.

4. Measures before starting work:

- Each job on the vehicle must be assigned by appropriately trained personnel. Before work is started, this electrician must place the vehicle in the operating condition required to perform the relevant activity. The qualified personnel's instructions and directions absolutely must be followed. **No work may be carried out without this qualified personnel being consulted first.**
- It is **not** permitted to work on the high voltage system or on high voltage components while the engine is running.
- The readiness to drive must be ended before shutting off the voltage of the high-voltage system. The readiness to drive is ended when the driver is absent only under the following conditions:
 1. seat belt buckle unlocked **and**
 2. the driver's door is open **and**
 3. no brake activated **and**
 4. the accelerator pedal is not activated **and**
 5. speed < 3 km/h (2 mph)
- Work on live high-voltage components is expressly prohibited. Before each operation on the high-voltage system, the system must be isolated from the power supply by qualified personnel (high-voltage safety connector Off) and secured against unauthorised recommissioning (padlock).
- After each deactivation of the high-voltage system, it is essential to observe a **waiting period** of at least **10 seconds** prior to further work.
- Before beginning work, it is mandatory to check that the equipment is de-energised and is protected against being energised again.
Work is only permitted to begin if:
 1. Corresponding display in the KOMBI **High-voltage system deactivated** orWhen a high-voltage warning is active (indicator light, Check Control, etc.), it is essential to determine and eliminate the cause of this warning via the diagnosis system before continuing with any other work.
If it cannot be definitively established that the equipment is de-energised, work is not permitted to begin. **Danger to life!** Before work begins, a qualified electrician (1000 V AC) must verify that the



system is de-energised using appropriate measuring devices and procedures.

=> In this case, Technical Support must be contacted!

- Do not perform any work on the vehicle while it is charging. Before starting work, disconnect the charging cable from the vehicle.
Battery charging may result in heating of the high-voltage battery unit. This heating may lead to sporadic launches of the electric fan (switch-on request from the electric fan). Therefore, work in the vicinity of the electric fan during the charging procedure is prohibited. Ensure freedom of movement of the battery charge lines in the vicinity of the electric fan.

5. *Measures during/after activities:*

- Identifiable mechanical damage to or tampering with high-voltage components must be reported immediately to the qualified personnel in charge.
- When carrying out any work on the high-voltage system, it is prohibited to drive externally all the drivetrain components (wheels, gearbox, drive shafts, etc.).
- *E72 only:* When the "Power Electronic Box Cover" is removed, the high-voltage system is not permitted to be activated. The high-voltage service disconnect must only be used when the "Power Electronics Box Cover" is completely installed.
- High-voltage cables (orange coating) and their connectors and stop parts **may not** be repaired. If damaged, a cable must always be replaced completely.
- When working in the vicinity of high-voltage components (identified accordingly with warning stickers and orange-coloured coating), protect these components against damage.
- The specified work steps in the repair instructions must be adhered to exactly.
- High-voltage components and their holders must be screwed/bolted to the defined tightening torque. Tightening torques and tightening specifications must be observed.
- Connecting high-voltage components to body ground is crucial to safety for reasons of equipotential bonding. For this reason, it is prohibited to operate any high-voltage components without them being correctly connected to body ground. The measurements (insulation/potential equalisation measurement) are performed automatically by the vehicle. Manual measurement is not therefore necessary.
For a correct earthing connection, the retaining elements of high-voltage components must not be painted. Follow further painting notes.
- Removed high-voltage battery units must be stored in a manner that protects them from misuse and damage.
- Damaged or warning stickers that are no longer legible on high-voltage components must always be replaced.

6. *Potential compensation:*

Equipotential bonding lines, high-voltage cables and the battery negative lead to the EME are fitted with safety screws.

- Clean contact faces and have then checked by a second person.
- Tighten down screws/bolts to specified torque.
- Have tightening torque checked by a second person.
- Both persons must document that the work has been carried out correctly in the vehicle records.



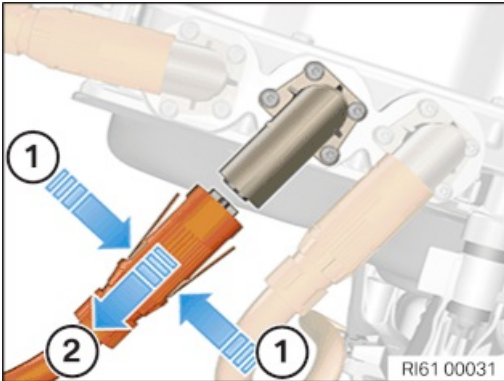
61 13 ... Unlocking and disconnecting various plug connections in electrical and hybrid vehicles



Attention!

Observe the following instructions for handling high-voltage plug connections:

- Damaged high-voltage plug connections must be replaced completely. Repair is not permitted.
- Dirt contamination must be removed before opening the plug connection.



Disconnect the Hirschmann high-voltage connector:

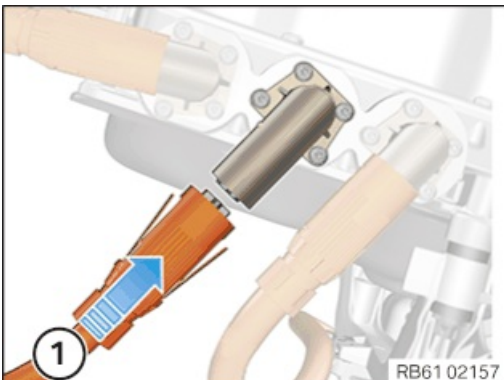
Press the lock (1) on the left and right on the connector in the direction of the arrow.

Pull off connector (2) in direction of arrow.

Attention!

Connector (2) is difficult to pull off.

In the event of damage to high-voltage connector (2), the complete high-voltage cable must be replaced!

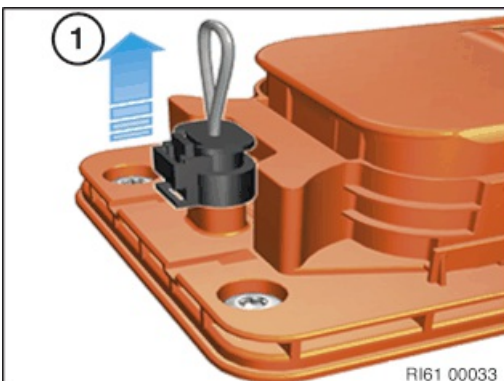


Connect the Hirschmann high-voltage connectors:

Slide the connector (1) on in the direction of the arrow.

Note:

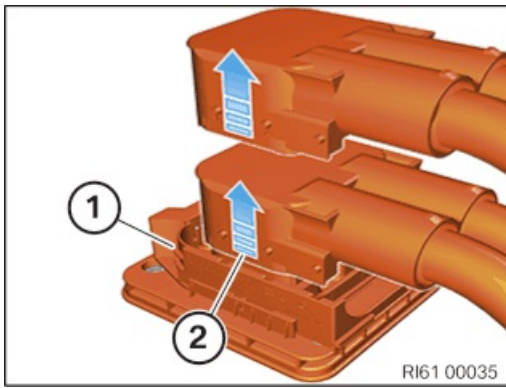
Connector (2) must lock audibly.



Disconnect the Kostal high-voltage connector:

Unlock and disconnect high-voltage interlock loop (1).





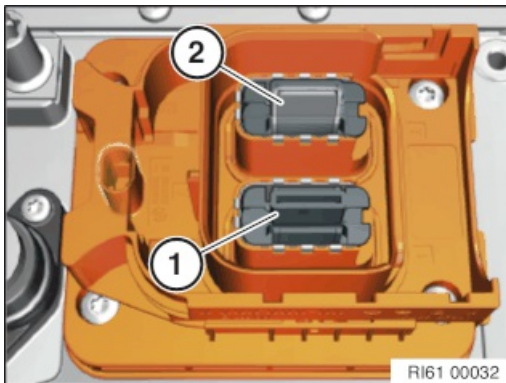
Push the lock (1) fully to the front.

Lift the connector (2) and remove it entirely.

Attention!

Plug connection (3) is difficult to pull off.

The connector (2) must be completely pulled off the opposite housing in one step. Damage may be caused to contact protection if connector is only partly pulled off and then closed again!



Check the Kostal high-voltage connector and connection for damage:

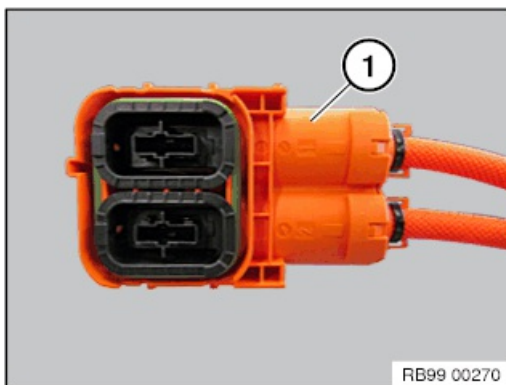
Check the touch protection for damage and correct positioning (1).

Warning!

Do not touch unprotected connector (2)!

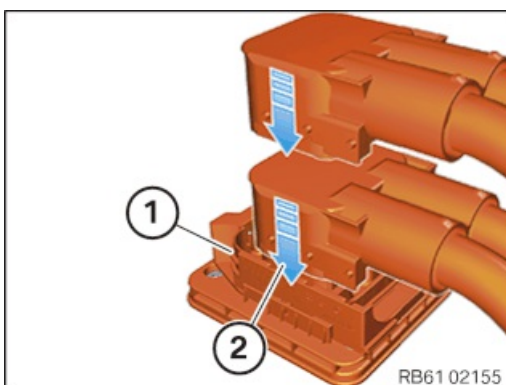
If the contact protection (1) has been pushed to the bottom (2), the high-voltage connector must be refitted.

If contact protection (1) remains in bottom position (2) after reinstallation, the contact protection is faulty and the component must be replaced!



Check the high-voltage connector (1) for damage. **Warning!**

In the event of damage to the high-voltage connector (1), the complete high-voltage cable must be replaced!



Connect the Kostal high-voltage connector:

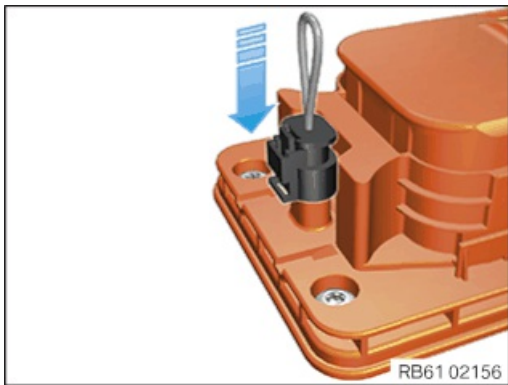
Connect the connector (2) in one single movement to the counter-housing.

Push the lock (1) fully to the rear.

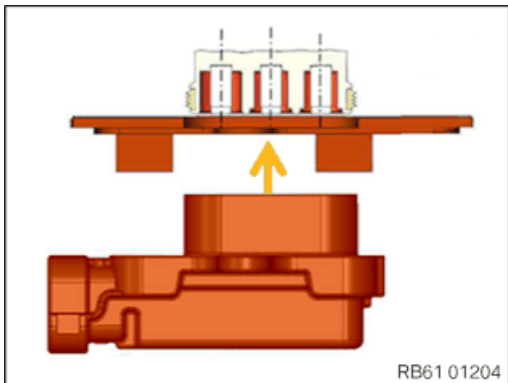
Attention!

Plug connection (3) must be correctly locked by lock (2), otherwise there is a risk of damage.



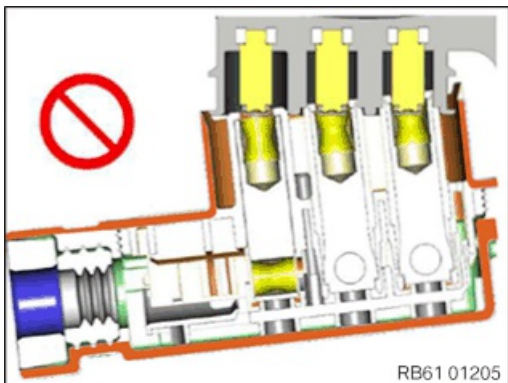


Connect the connector for the high-voltage interlock.



Three-phase high-voltage connector:

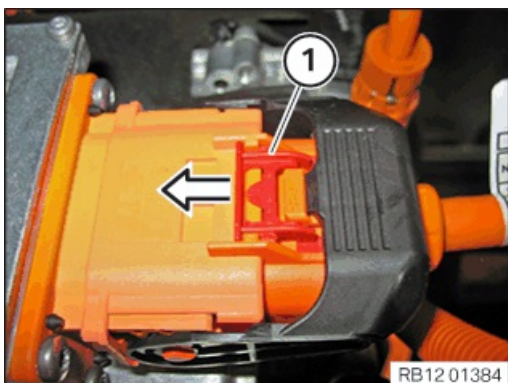
Connect and disconnect the connector straight.



Attention!

The system is designed to only offer limited protection against damage caused by connectors that are inserted at an angle.

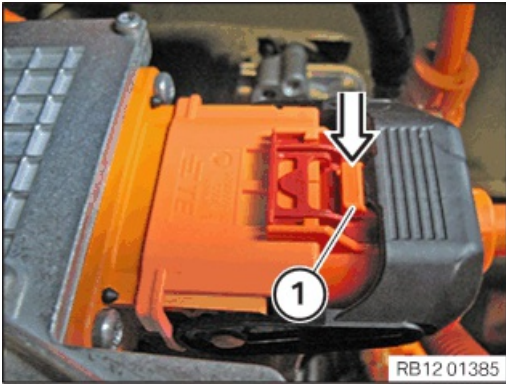
Increased tilted connections will increase the connecting force and the risk of danger.



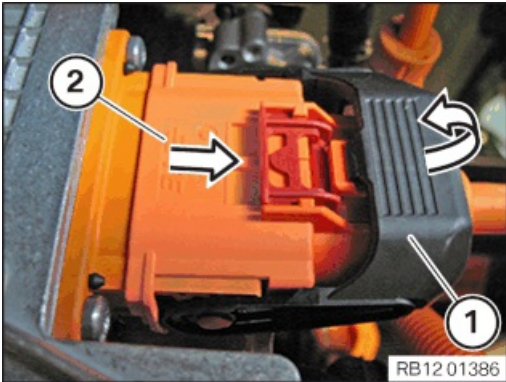
Disconnect the high-voltage connector from the high-voltage connection of the KLE:

Slide lock (1) in direction of arrow up to stop.

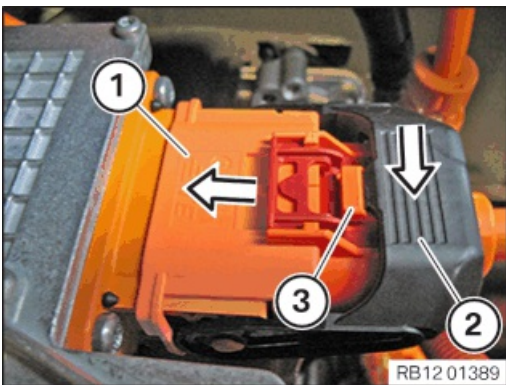




Press lock (1).



Open the lock (1) completely and disconnect the connector (2).



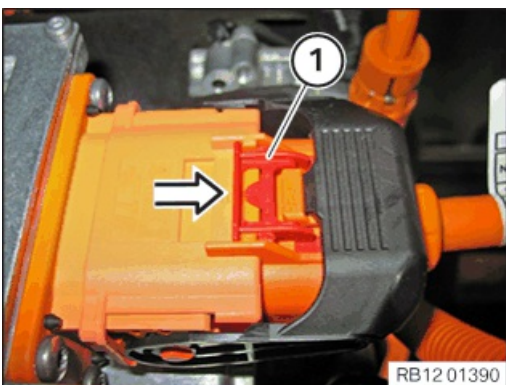
Connect the high-voltage connector to the high-voltage connection of the KLE:

Connect the connector (1) to the limit position and close the lock (2).

Attention!

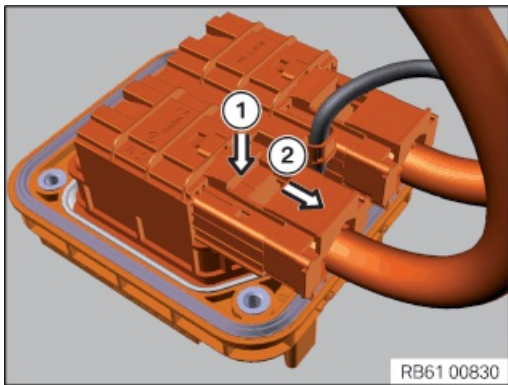
Lock (2) must snap audibly into place.

The retaining lug of the lock (2) must be positioned completely under the lock (2).



Slide the lock (1) on to the stop in the direction of the arrow.





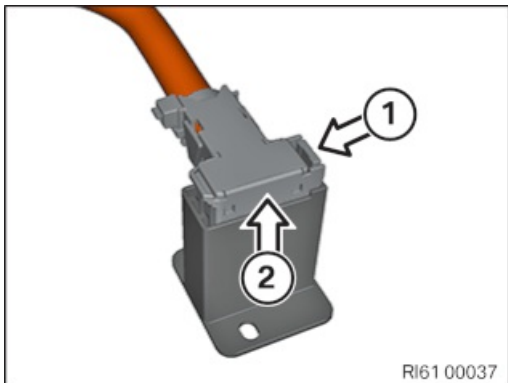
High-voltage connector on the high-voltage connection of the high-voltage battery unit:

Press down unlocking (1) in direction of arrow and pull off connector in direction of arrow (2).

Attention!

Contact protection is no longer provided in the event of a damaged connector housing.

In this case, contact technical support.



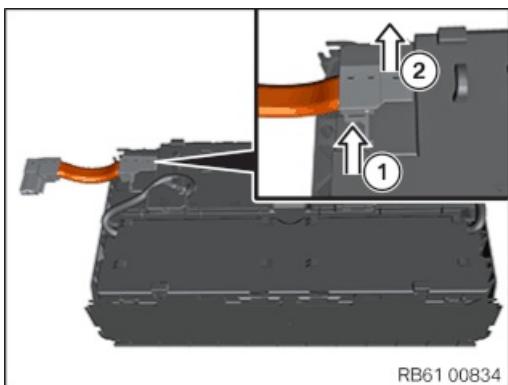
High-voltage connector on the cell module I01:

Press unlocking device (1) together and pull off connector upwards (2).

Attention!

Contact protection is no longer provided in the event of a damaged connector housing.

In this case, contact technical support.



High-voltage connector on the cell module (cell module connecting line):

Press unlocking (1) in direction of arrow and pull off connector in direction of arrow (2).

Attention!

Contact protection is no longer provided in the event of a damaged connector housing.

In this case, contact technical support.



**Special tools required:**

- 12 1 220

**Necessary preliminary tasks:**

- Switch off ignition.
- Remove ignition coils.

**Important!**

Wear safety goggles.

Oil and dirt particles may get into your eyes!

Clean spark plug slot with compressed air.

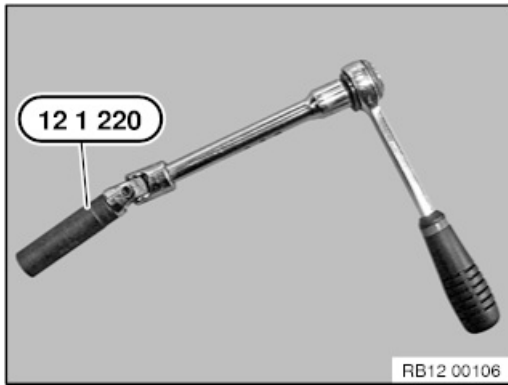
1. Remove dirt contamination from the spark plug shaft. The plug shaft must be cleaned with compressed air after the ignition coils have been removed but before the spark plugs have been dismantled. After removing the spark plugs, check the sealing surface again for dirt contamination and if necessary, clean with a damp cloth or again with compressed air.

Note: Deposits that are not removed according to instructions may enter the combustion chamber and lead to uncontrolled combustion. Remaining deposits in the area of the spark plug seal can lead to leaks and to the spark plugs coming loose during engine operation.

2. Do not grease/oil thread or use any graphite or copper grease. Adhere to the torque values of the packaging information or regulation.

Note: If these instructions are not followed, especially with regard to greasing, this may result in mechanical damage to the spark plug housing/thread. Spark plugs that are not tightened sufficiently lead to leaks and to the spark plugs coming loose during engine operation.





Unscrew spark plugs with special tool 12 1 220 and an extension with joint.

Flexible ratchet extensions must always be used. If rigid mounting tools are used, there is a risk of insulator breakages.

Note: Also do not use a variable plug connection with locking capability as this also poses a risk of insulator breakages.

Installation note:

Do not let spark plugs fall into the spark plug shaft. This can lead to a reduction of the electrode gap and so impair the smooth running of the engine, especially in idle mode.

First screw spark plugs into engine finger-tight with special tool 12 1 220 and extension with joint.

Then tighten spark plug with torque wrench, special tool 12 1 220 and extension with joint.

Observe tightening torque.

Tightening torque 12 12 2AZ.





Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Check stored fault messages and process procedure.
- Switch off ignition.

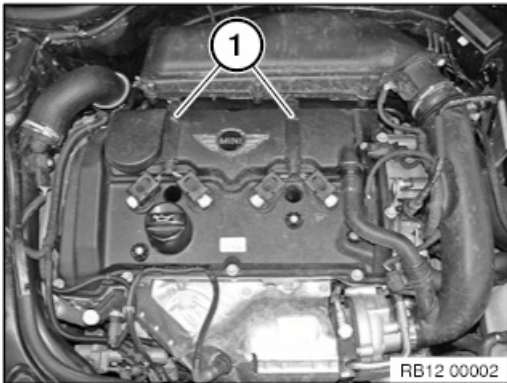


Important!

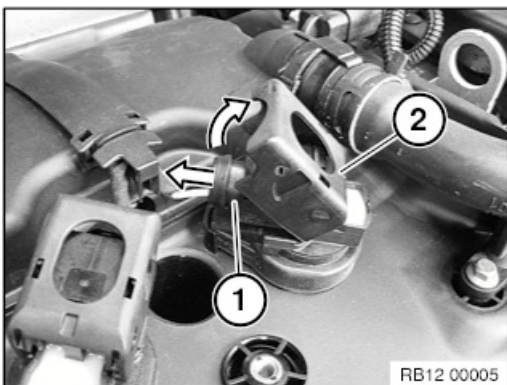
Ignition coils must not be contaminated by fuel.

The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

The silicone tube of the spark plug connector is coated with talc to reduce the pulling forces. The silicone tube must NOT be oiled or greased. This would greatly reduce the durability of the silicone material, which can lead to a malfunction of the ignition coil.



Pull the cable clip (1) forward slightly and release toward the top. Simply loosen the cable clip but do not remove it.



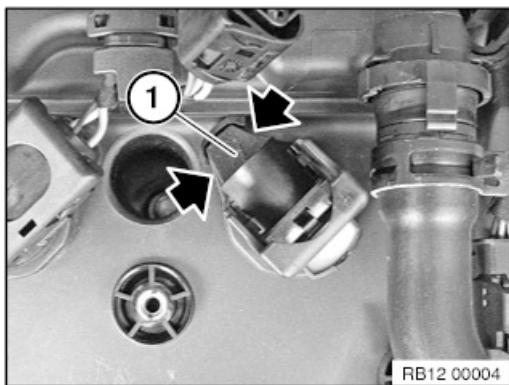
Unlock the plug latch mechanism (2) of the ignition coil and pull disconnect the connector (1).

Pull out the ignition coil (2) slowly in a smooth upwards movement.

Note: There is a possibility that the silicone tube will tear and therefore be destroyed.

This procedure is applicable to all ignition coils.



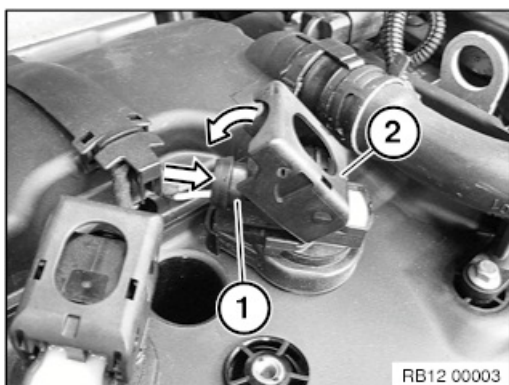


Installation note:

Position the ignition coil (1) and gently push it to the limit position, if necessary by twisting it back and forth slightly. Then check anti-twist lock.

The rubber cap must completely surround the sealing collar of the cylinder head cover.

Note: If rubber parts are squashed, the ignition coil can slip out again during engine operation.



Installation note:

Push connector (1) with connector catch (2) open onto ignition coil.

Carefully close connector catch (2) in direction of arrow.

The connector catch must snap into place without great effort.

The connector must be positioned on the counter piece with hardly any gaps when the locking lever is being closed. In the process, the cheeks of the lever are positioned inside the counter piece.

Note: The locking lever can become deformed if it is not installed correctly. This means that there is no longer a safety lock on the plug connection. As a result, the connector can slip out during engine operation (loose contact, misfiring).



Note:

Delete fault memory.



Switch off ignition.



Connect diagnosis system.

Switch the ignition on.

Select "encoding" program.

Follow the instructions in the diagnosis system.

Adjust the following control units:

- EWS (electronic immobiliser)
- DME (Digital Motor Electronics) or
- DDE (Digital Diesel Electronics)

Follow Service Information "Diagnosis and Encoding" on the topic of encoding.



Switch off ignition.



Connect diagnosis system.

Switch the ignition on.

Select "Programming".

Follow the instructions in the diagnosis system.

Adjust the following control units:

- EWS (electronic immobiliser)
- DME (Digital Motor Electronics) or
- DDE (Digital Diesel Electronics)

Follow Service Information "Diagnosis and Encoding" on the topic of programming.





Necessary preliminary work:

- Switch off ignition.
- Clamp off battery.

Important!

Follow notes for removing and installing electronic control units.



Important!

It is absolutely essential to read out the fault memory with the MINI diagnosis system and create a fault memory printout.

Switch off ignition.



Important!

Read and comply with notes on protection against electrostatic damage (ESD protection).

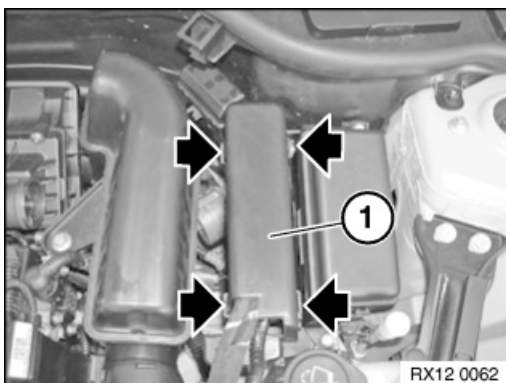


Replacement:

- Carry out programming/encoding.

Note:

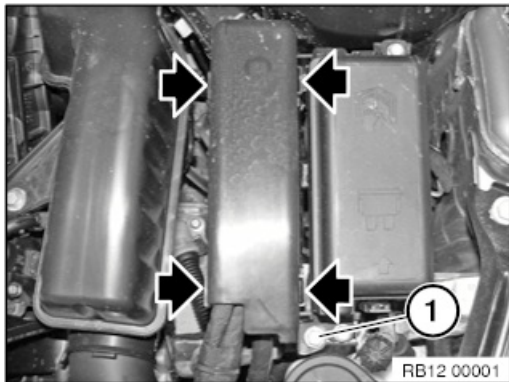
- Connect diagnosis system.
- Read fault memory.
- Check stored error/fault messages.
- Rectify fault.
- Delete fault memory.



Version 1:

Unlock and remove cover (1).

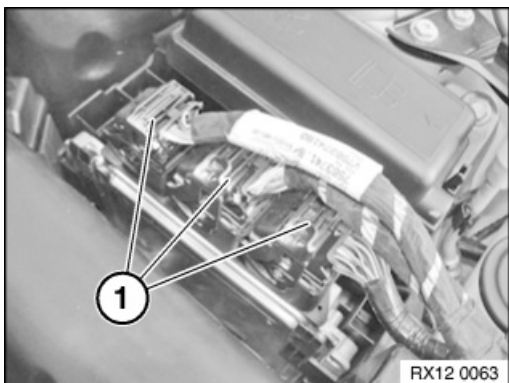




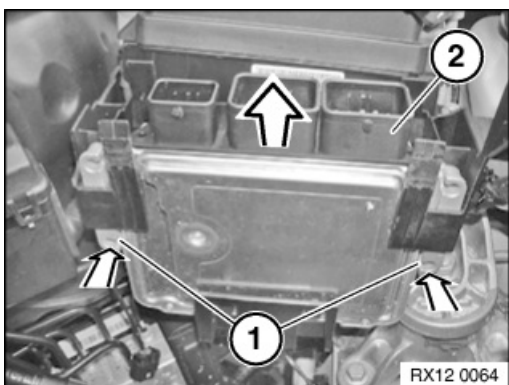
Type 2:

Release screw (1) at side.

Unlock clamps and remove cover.



Unlock connector (1) and remove.



Press locks in direction of arrow and remove control unit (2) towards top.

Locks are accessible through bore holes (1).



Note:

- Reassemble the vehicle.
- Check stored fault messages.
- Delete fault memory.

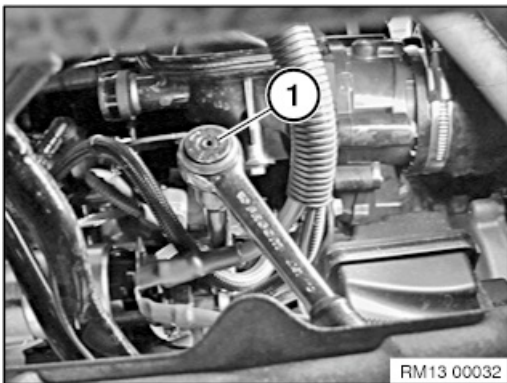


*Necessary preliminary tasks:*

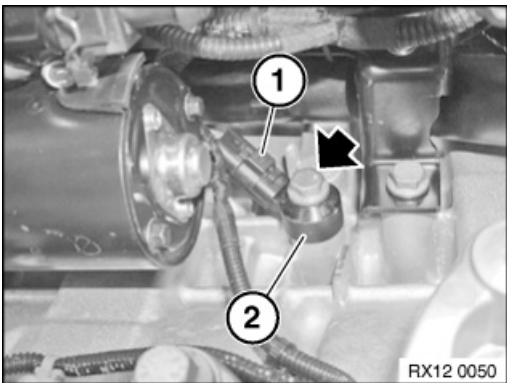
- Switch off ignition.
- Read out the fault memory of the DME control unit.
- Check stored fault messages.
- Disconnect negative battery cable.
- **All-wheel drive vehicles only:**
Remove intake plenum.

Installation location:

The knock sensor is located under the intake plenum next to the starter motor.



Use a reversible ratchet (1) and extension to release the screw of the knock sensor from below.



Release screw and remove knock sensor (2).

Pull knock sensor slightly downwards until the connector of the knock sensor is accessible. Unlock connector (1) and remove.

Installation note:

Clean contact surface of knock sensor on engine block.

Tightening torque 13 62 2AZ.

*Note:*

Delete fault memory.



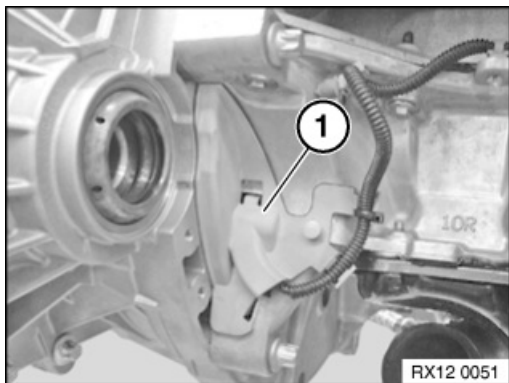


Necessary preliminary tasks:

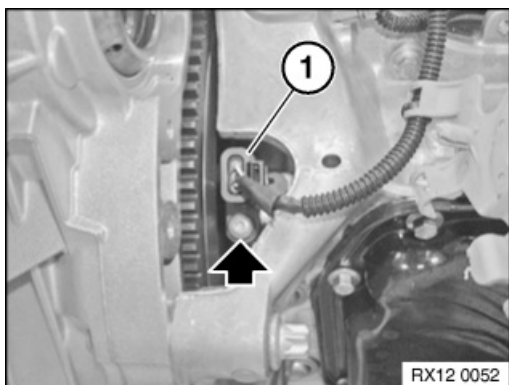
- Switch off ignition.
- Read out the fault memory of the DME control unit.
- Remove transfer box.

Note:

For a better overview, the following operation is shown on the engine after it has been removed.



Remove cover (1).



Unlock connector (1) and remove.

Release screw and remove pulse sensor.

Tightening torque 13 62 3AZ .



Note:

Check stored fault messages.

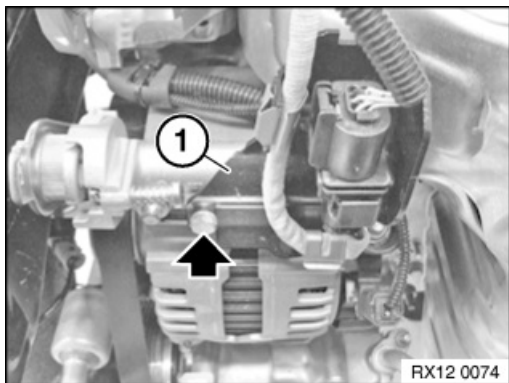
Delete fault memory.





Necessary preliminary tasks:

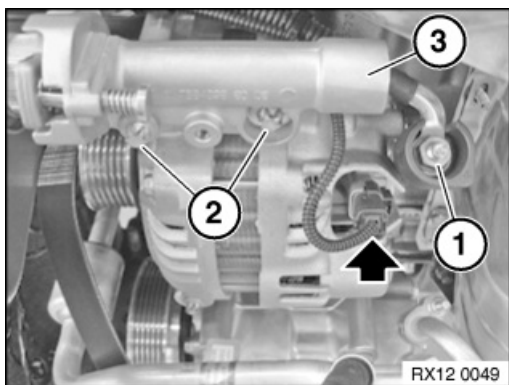
- Switch off ignition.
- Disconnect battery earth lead.
- Remove air conditioning compressor.



N18 only:

Release screw.

Remove holder (1) and place to one side.



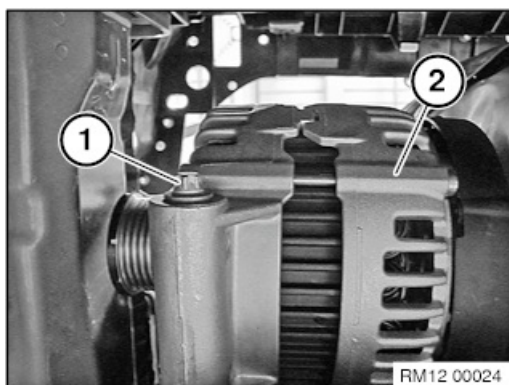
Release connector and remove.

Release nut (1) and remove positive battery cable.

Tightening torque 12 31 2AZ.

Loosen screws (2) and remove the belt tensioner (3).

Tightening torque 11 28 1AZ.



Release screw (1).

Tightening torque 12 31 1AZ.

Remove alternator (2) downwards.



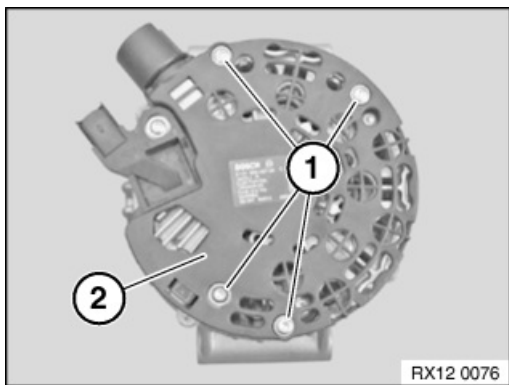
Reassemble the vehicle.





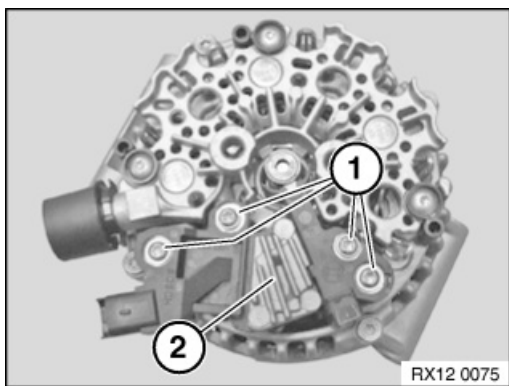
Necessary preliminary tasks:

- Disconnect battery earth lead.
- Remove alternator.



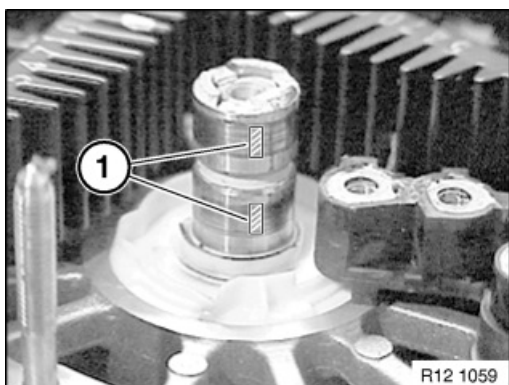
Release screws (1).

Remove cover (2).



Release screws (1).

Remove the voltage regulator (2).



Check contact surfaces (1) of slip rings for wear and recondition if necessary.



Assemble alternator.

Carry out alternator test with diagnosis system.



11 00 ... **Handling components after flood damage**

Flood damage can occur if the permissible fording depth of a vehicle is exceeded. Ingress of water can cause damage to the engine (water shock) or components.

Because dirt particles generally enter into the component with the water (e.g. starter motor, wiring harness), the components need to be thoroughly inspected.

Residual moisture in the components leads to corrosion (increased contact resistance in the component), which can lead to a component failure at a later time.

If water ingress into the electrical components cannot be ruled out, it is recommended to replace the component to ensure correct functioning through the vehicle lifetime.

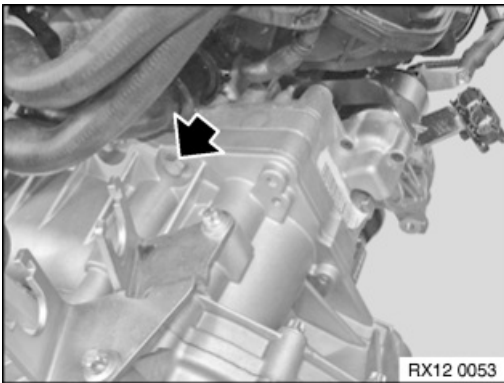


*Necessary preliminary work:*

- Switch off ignition.
- Clamp off battery.
- Remove intake plenum.

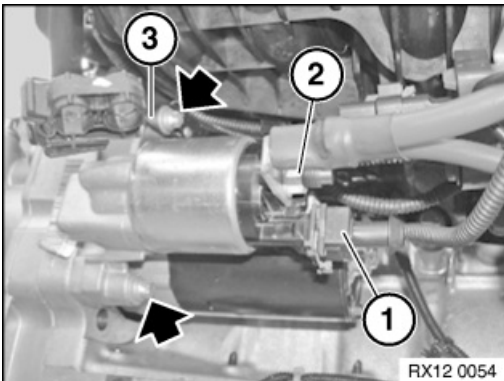
Note:

For a better overview, the following operation is shown on the engine after it has been removed.



Release screw.

Tightening torque 12 41 1AZ.



Release connector (1) and remove.

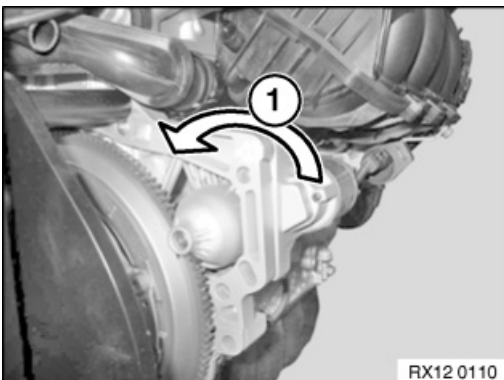
Release nut (2) and remove the positive battery cable.

Tightening torque 12 41 2AZ.

Release screws.

Tightening torque 12 41 1AZ.

Remove bracket (3) and starter from the top.

*Installation note:*

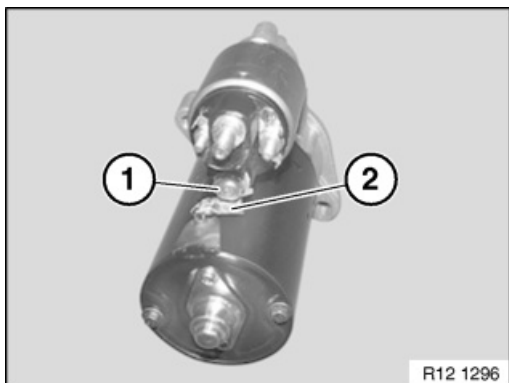
Install starter motor and fit screws.

Press starter motor (1) in direction of arrow and tighten down.



**Necessary preliminary work:**

- Switch off ignition.
- Remove starter motor.



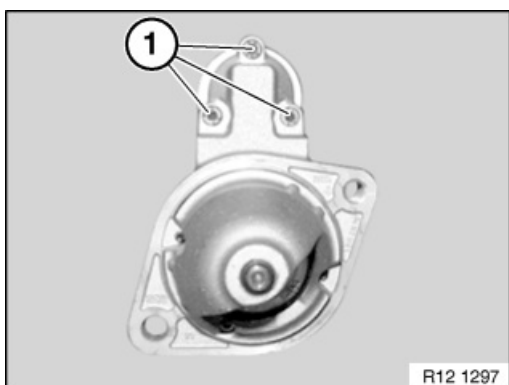
Slacken nut (1).

Remove the cable shoe (2).

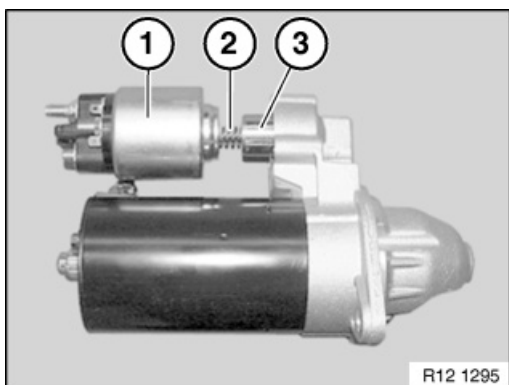
Attention!

Do not twist the cable shoe (2) when tightening, risk of shorting to starter motor housing.

Tightening torque 12 41 1AZ.



Release screws (1).



Remove the solenoid switch (1) and the spring (2).

Detach the bolt (3).

Installation note:

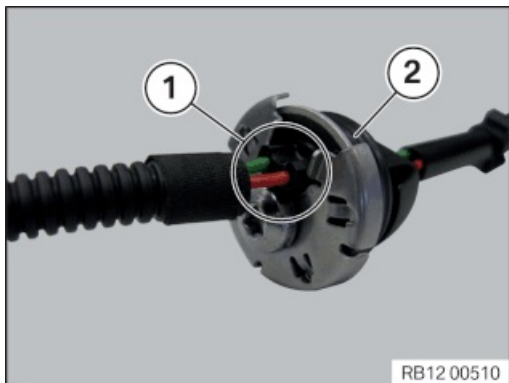
Check the bolt (3) for wear and grease the bolt.





Attention!

Only one repair kit may be installed.



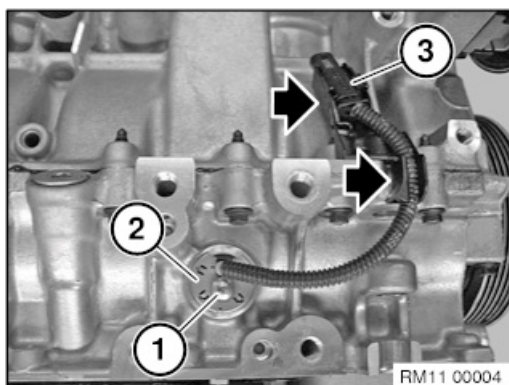
Note:

Repair kit is identifiable from the individual wires (green/red) (1) and the black coating of the cable duct (2).



Necessary preliminary work:

- Remove front underbody protection (only N13)
- Remove right output shaft (all N16/N18)
- All-wheel drive vehicle with manual gearbox only: Remove transfer box
- Remove bottom engine block (only transverse installation)



All vehicles:

Release screw (1).

Remove sealing plate (2).

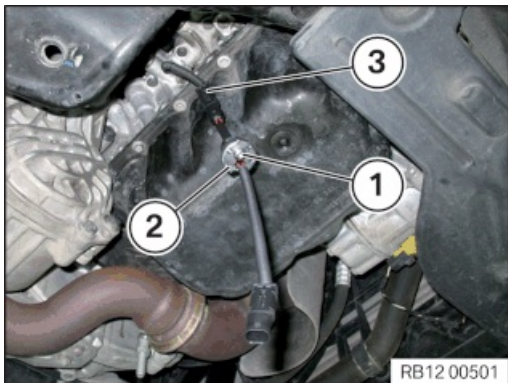
Unfasten plug connection (3) and disconnect.

Unclip cable from cable clip.

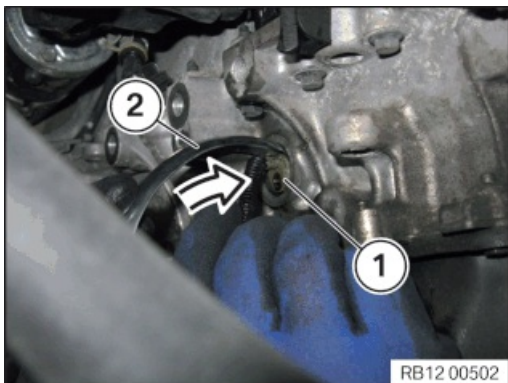




Lever out sealing ring (1).
Feed out and remove sealing ring (1).

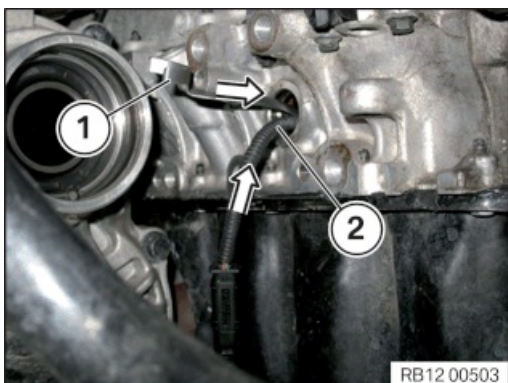


Loosen bolt (1) by approx. 2 rotations.
Connect new cable duct (2) to previous cable duct (3).



Note:
Previous cable duct remains in oil sump.

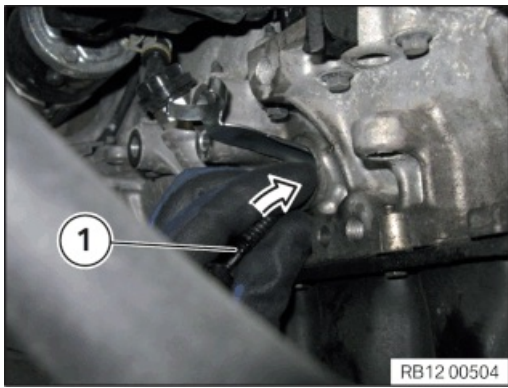
Slide in previous cable duct (1) into oil sump by using supplied tool (2).



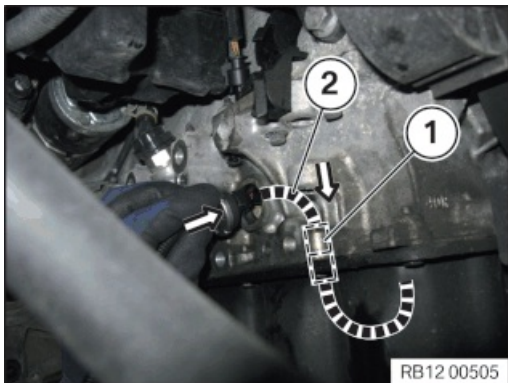
Note:
Schematic diagram of all-wheel drive vehicle.

Insert tool (1) and previous cable duct (2) as deep as possible past oil deflector.



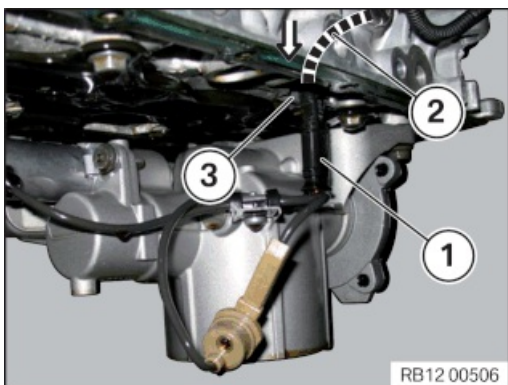


Insert cable with plug connection (1).



To make sure that connector housing (1) was inserted past oil deflector, cable (2) must point downwards and may not be kinked.

Remove tool.



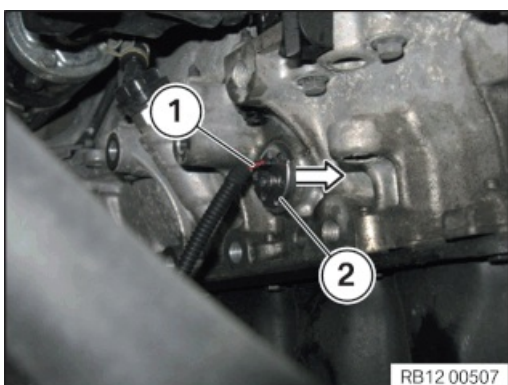
Note:

Oil sump shown removed for purposes of clarity.

(1) Connector housing

(2) Cable

(3) Oil deflector

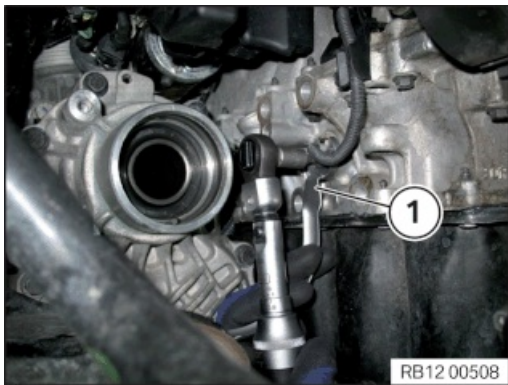


Note:

Cable outlet (1) must point upwards.

Press in new cable duct (2) into crankcase until it is felt to engage.





Note:

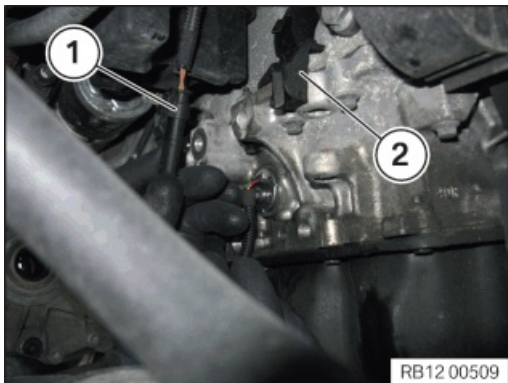
Schematic diagram of all-wheel drive vehicle.

Insert tool (1) into recesses of sealing plate.

Hold handle vertically and counter support.

Screw sealing plate.

Tightening torque 11 41 5AZ.



If necessary, retrofit additional wiring harness for oil pump solenoid valve.

Establish plug connection (1) and clip in into cable clip (2).



Reassemble the vehicle.



**Attention!**

Read and comply with notes on protection against electrostatic discharge (ESD protection)!

**Attention!**

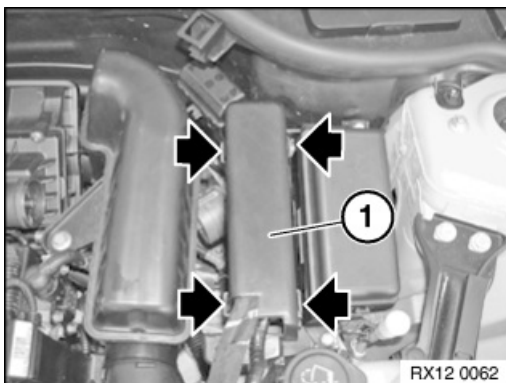
Gaiter and charge air hoses with clamp fastenings must be installed dry and free from grease!

Sealing surfaces and connecting branches must be dry and free from grease.

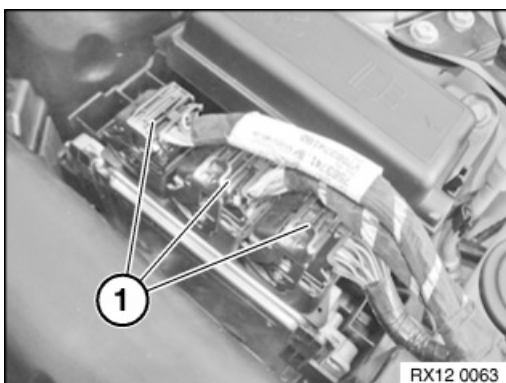
If gaiter and charge air hoses with clamp fastenings are not installed dry and free from grease, this may result in exhaust turbocharger failure!

*Necessary preliminary work:*

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Disconnect battery earth lead.
- Remove intake plenum.
- Remove sound generator.
- Remove right engine mount.
- **All-wheel drive vehicle only:**
 - Remove transfer box.

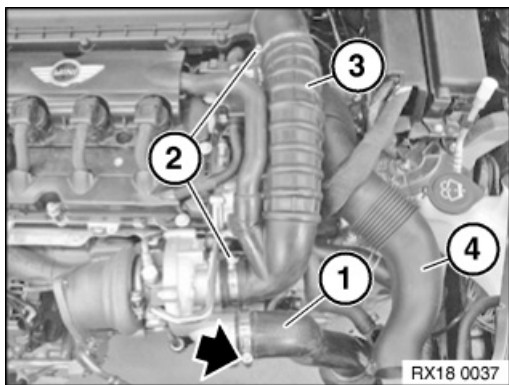


Unlock and remove cover (1).



Unlock and detach the two rear connectors (1).





Release clamps (2).

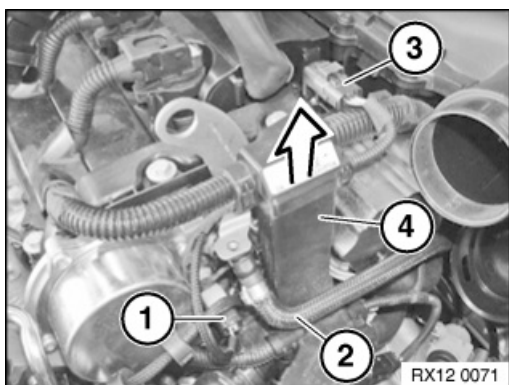
Pull off gaiter (3) and remove it.

Remove intake pipe (4).

Installation note:

Install gaiter (3) dry and free from grease.

Connecting branch on exhaust turbocharger must be dry and free from grease.



Unlock and pull off connectors (1 and 3).

Unlock and detach vacuum line (2).

Carefully pull cable channel (4) upward away from the holder.

Work step	Note
Unlock and pull off connector for coolant temperature sensor.	N14
Unlock and pull off connector for ignition coils	
Release ground connection from cylinder head	Tightening torque 12 51 1AZ.
Unlock and pull off connector for control sensor	
Unlock and pull off connector for electric valve from exhaust turbocharger	
Unlock and pull off connector for auxiliary coolant pump	
Unlock and pull off connector for monitoring sensor	
Unlock and pull off connector for coolant thermostat	
Unlock and pull off connector for high pressure pump	
Release connector for high pressure sensor and remove.	
Unlock and pull off connector for knock sensor	
Unlock and pull off connector for crankshaft sensor	
Unlock and pull off connector for injectors	
Unlock and pull off connector for solenoid valve	
Unlock and pull off connector for temperature and charging pressure sensor	
Unlock and pull off connector for friction wheel	



Note:

Check stored fault messages.

Delete the fault memory.



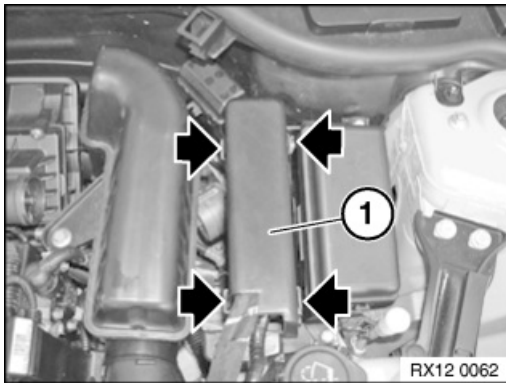


Comply with notes on processing cables.



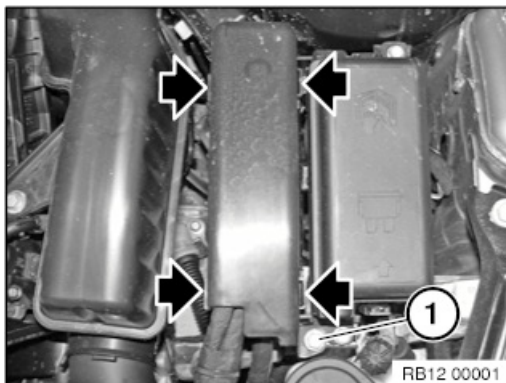
Necessary preliminary tasks:

- Disconnect battery earth lead
- Install repair kit for oil pump solenoid valve wiring
- Remove intake silencer housing



Version 1:

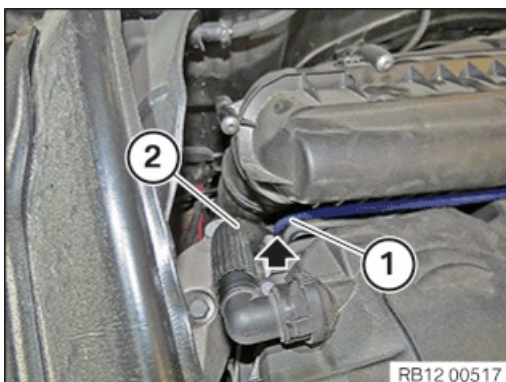
Unlock and remove cover (1).



Version 2:

Release screw (1) at side.

Unlock clamps and remove cover.



N16:

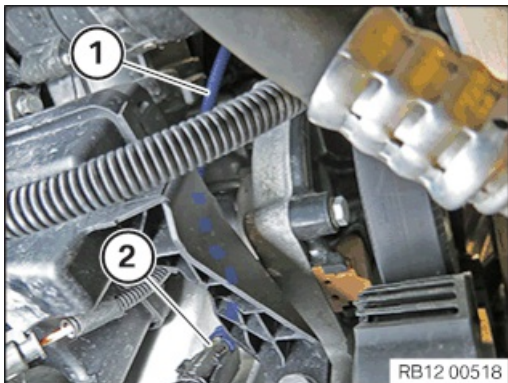
Feed additional wiring harness (1) downwards under tank ventilation line (2) as shown.





N18:

Lay additional wiring harness (1) downwards around intake plenum as shown.

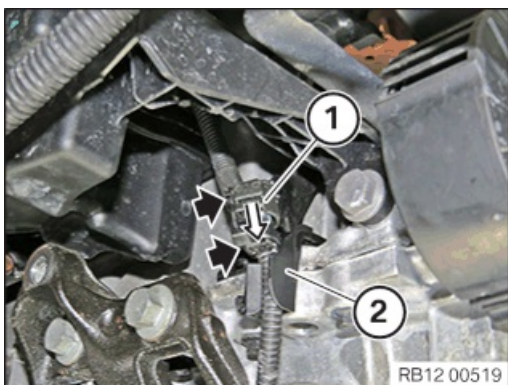


N16 and N18:

Lay additional wiring harness (1) downwards behind coolant pipe.

Connect additional wiring harness (1) to oil pump solenoid valve wiring (2).

Clip plug connection (2) into holder.

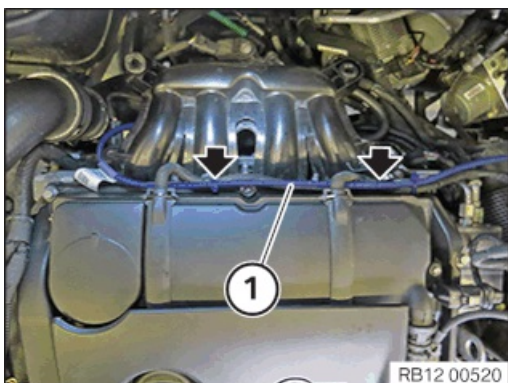


N16 and N18:

Attention!

Existing wiring harness (1) must not remain loose.

Secure existing wiring harness (1) facing downwards to new plug connection (2).



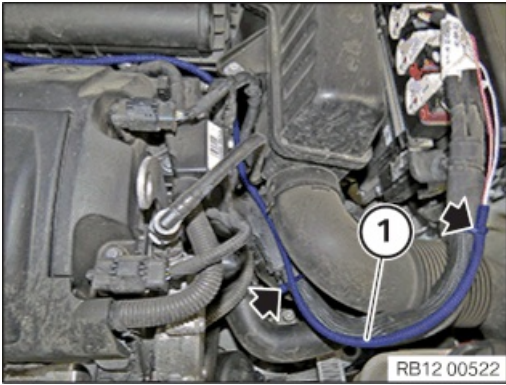
N16 and N18:

Lay and connect additional wiring harness (1) as shown.

Note:

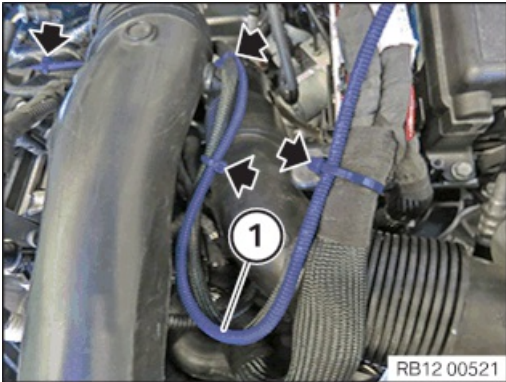
Figure N18.





N16:

Lay and connect additional wiring harness (1) as shown.



N18:

Lay and connect additional wiring harness (1) as shown.



N16:

Connect additional wiring harness as follows:

Attention!

The prior connection of the power supply line (orange) must continue to exist.

Crimp pin 1 (red) of the additional wiring harness onto pin 41 of 53-pin control unit connector X60211 (1) on engine wiring harness.

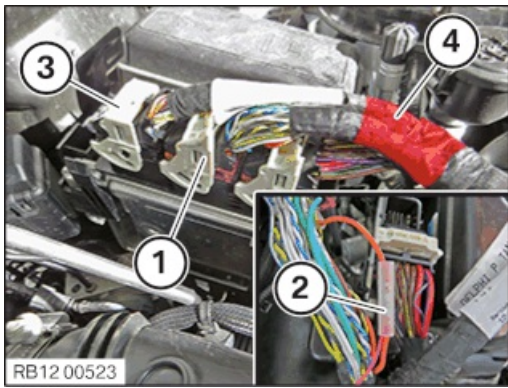
To do so, first disconnect the cable from the engine wiring harness (orange) and then reconnect. While doing so, also connect the cable from the additional wiring harness (red). You now have a 3-cable connection here.

Connect **pin 2 (white)** onto chamber A1 of 32-pin control unit connector X60212 (3). The original signal line is no longer needed and can be tied back.

Note:

Set cable connector in marked area (4).





N18:

Connect additional wiring harness as follows:

Attention!

The prior connection of the power supply line (orange) must continue to exist.

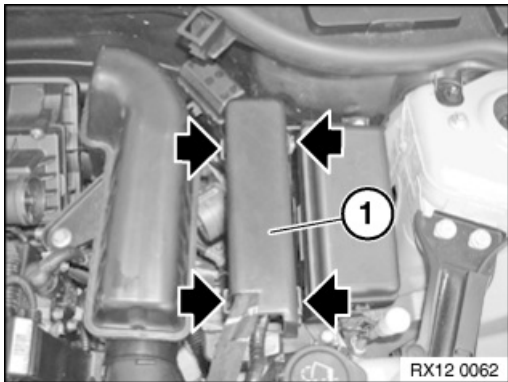
Crimp pin 1 (red) of the additional wiring harness onto pin 17 of 53-pin control unit connector X60231 (1) on engine wiring harness.

To do so, first disconnect the cable from the engine wiring harness (orange) and then reconnect. While doing so, also connect the cable from the additional wiring harness (red). You now have a 3-cable connection here.

Connect **pin 2 (white)** onto chamber K2 of 48-pin control unit connector X60232 (3). The original signal line is no longer needed and can be tied back.

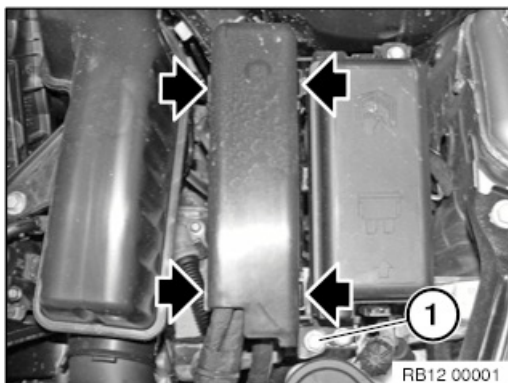
Note:

Set cable connector in marked area (4).



Version 1:

Install and lock cover (1).



Version 2:

Install and lock cover.

Tighten bolt (1).



Required follow-up work:

- Connect battery earth lead
- Install intake silencer housing



61 00 ... Safety information on handling hybrid cars

1. Qualification:

All repair work on high-voltage components may **only be performed by specially trained personnel** (qualification: Work on high-voltage inherently safe vehicles) must be performed by qualified technicians. Each hybrid car requires additional vehicle specific training with training achievement controls.

Required training is offered by the BMW Training Academy.

2. Identification:

Observe **warning notices** on high-voltage components. When replacing individual high-voltage components, check if warning stickers are present. Independently attaching warnings is only allowed on the locations provided for them. Use only approved and appropriately identified original new parts.

3. Rules of conduct/protective measures:

- Note operating instructions for handling high-voltage battery units.
- Do not under any circumstances touch open high-voltage cables and high-voltage components on damaged vehicle before shutting down the high-voltage electrical system.
- In the event of damage (mechanical, thermal) transition metal oxides, carbon, electrolyte solvents and their products of decomposition may be released.
Suitable acid-resistant protective clothing/equipment must therefore be used when handling the vehicle!

- Hand protection: Gloves
- Eye protection: Safety goggles

Damaged high-voltage battery units must be stored in an acid-resistant pan in a location in the open that is protected against the weather (sun, rain) and secured against unauthorised access. Do not inhale escaping gasses.

- Prevent escaping substances from entering drains, pits and the sewer system.
- Collect any material that is discharged and have it disposed of according to the work instruction, wear acid-resistant protective clothing when doing so.
- Notify the fire brigade if fire breaks out, clear the area immediately and make accident scene safe. Attempt to extinguish the fire without putting persons in danger (suitable extinguishant: water and water foam).
- A cut 2nd emergency separation point must be repaired with a butt connector.

4. Measures before starting work:

- Each job on the vehicle must be assigned by appropriately trained personnel. Before work is started, this electrician must place the vehicle in the operating condition required to perform the relevant activity. The qualified personnel's instructions and directions absolutely must be followed. **No work may be carried out without this qualified personnel being consulted first.**
- It is **not** permitted to work on the high voltage system or on high voltage components while the engine is running.
- The readiness to drive must be ended before shutting off the voltage of the high-voltage system. The readiness to drive is ended when the driver is absent only under the following conditions:
 1. seat belt buckle unlocked **and**
 2. the driver's door is open **and**
 3. no brake activated **and**
 4. the accelerator pedal is not activated **and**
 5. speed < 3 km/h (2 mph)
- Work on live high-voltage components is expressly prohibited. Before each operation on the high-voltage system, the system must be isolated from the power supply by qualified personnel (high-voltage safety connector Off) and secured against unauthorised recommissioning (padlock).
- After each deactivation of the high-voltage system, it is essential to observe a **waiting period** of at least **10 seconds** prior to further work.
- Before beginning work, it is mandatory to check that the equipment is de-energised and is protected against being energised again.
Work is only permitted to begin if:
 1. Corresponding display in the KOMBI **High-voltage system deactivated** orWhen a high-voltage warning is active (indicator light, Check Control, etc.), it is essential to determine and eliminate the cause of this warning via the diagnosis system before continuing with any other work.
If it cannot be definitively established that the equipment is de-energised, work is not permitted to begin. **Danger to life!** Before work begins, a qualified electrician (1000 V AC) must verify that the



system is de-energised using appropriate measuring devices and procedures.

=> In this case, Technical Support must be contacted!

- Do not perform any work on the vehicle while it is charging. Before starting work, disconnect the charging cable from the vehicle.
Battery charging may result in heating of the high-voltage battery unit. This heating may lead to sporadic launches of the electric fan (switch-on request from the electric fan). Therefore, work in the vicinity of the electric fan during the charging procedure is prohibited. Ensure freedom of movement of the battery charge lines in the vicinity of the electric fan.

5. *Measures during/after activities:*

- Identifiable mechanical damage to or tampering with high-voltage components must be reported immediately to the qualified personnel in charge.
- When carrying out any work on the high-voltage system, it is prohibited to drive externally all the drivetrain components (wheels, gearbox, drive shafts, etc.).
- *E72 only:* When the "Power Electronic Box Cover" is removed, the high-voltage system is not permitted to be activated. The high-voltage service disconnect must only be used when the "Power Electronics Box Cover" is completely installed.
- High-voltage cables (orange coating) and their connectors and stop parts **may not** be repaired. If damaged, a cable must always be replaced completely.
- When working in the vicinity of high-voltage components (identified accordingly with warning stickers and orange-coloured coating), protect these components against damage.
- The specified work steps in the repair instructions must be adhered to exactly.
- High-voltage components and their holders must be screwed/bolted to the defined tightening torque. Tightening torques and tightening specifications must be observed.
- Connecting high-voltage components to body ground is crucial to safety for reasons of equipotential bonding. For this reason, it is prohibited to operate any high-voltage components without them being correctly connected to body ground. The measurements (insulation/potential equalisation measurement) are performed automatically by the vehicle. Manual measurement is not therefore necessary.
For a correct earthing connection, the retaining elements of high-voltage components must not be painted. Follow further painting notes.
- Removed high-voltage battery units must be stored in a manner that protects them from misuse and damage.
- Damaged or warning stickers that are no longer legible on high-voltage components must always be replaced.

6. *Potential compensation:*

Equipotential bonding lines, high-voltage cables and the battery negative lead to the EME are fitted with safety screws.

- Clean contact faces and have then checked by a second person.
- Tighten down screws/bolts to specified torque.
- Have tightening torque checked by a second person.
- Both persons must document that the work has been carried out correctly in the vehicle records.



**Special tools required:**

- 11 8 720

**Warning!**

Risk of burning!

Carry out this repair only when the engine has cooled down.

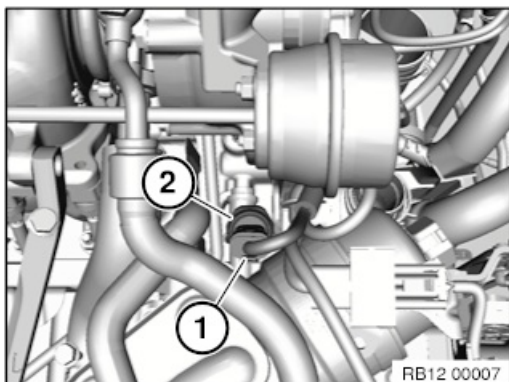
**Necessary preliminary tasks:**

- Switch off ignition.
- Remove fan cowl.

**Installation location:**

The oil pressure sensor is located in the oil filter housing.

Engine oil may emerge when oil pressure sensor is replaced; have a cleaning cloth ready.



Unlock connector (1) and pull off.

Release the oil pressure sensor (2) with special tool 11 8 720 .

Installation note:

- Renew the sealing ring.
- Tightening torque 12 61 1AZ.
- Check engine oil level, top up engine oil if necessary.



Assemble engine.



**The following applies in general:**

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies:Shielded lines

Interference radiation and interference resistance can lead to neutral zones at contact points in the shielding. Consequently, distinctions have to be drawn between the following types:

Coaxial lines

- Shielded coaxial cables RTK031 may only be repaired with special crimping tool.
- For aerial lines only the bushing contact may be repaired.
- RG174 Lines and the bushing contact may not be repaired.

CVBS lines

- CVBS cables may not be repaired.
- CVBS cables must be replaced in their entirety.

HSD lines

- HSD cables may not be repaired.
- HSD cables must be replaced in their entirety.

Optical fibre cable:*Note:*

Fibre-optic cables are coloured differently as follows:

- Green = **MOST** (Media Oriented Systems Transport) optical fibres
- Yellow = **ISIS** (Intelligent Safety and Integration System) optical fibres
- Orange=repair fibre-optic cables

Attention!

- Fibre-optic cables are permitted to show only one junction point (bridge), replace fibre-optic cables if necessary
- Smallest permissible bending radius is 25 mm
- Avoid effects of heat $\geq 85^\circ$

Treating cables and optical fibres

FlexRay (twisted cables)

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

Note:

- FlexRay lines may only reveal one separation point (bridge) per line



- Flexray lines may only reveal one separation point (bridge); renew complete line if necessary.
- If possible, maintain twisted cable after repair.
- After repairs, twist cables as close as possible to the connector/separation point.
- Twisting must be as symmetrical as possible.

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables

Replacing wiring harnesses

Repair wiring harnesses mainly cover the full equipment of the vehicle. If certain optional equipment is not installed in the vehicle, note the following:

- If necessary, secure the remaining connectors.
- If necessary, seal the remaining connectors outside the vehicle interior, for example, with butyl tape in such a way that moisture ingress can be eliminated permanently.

Note:

Repair wiring harnesses can be equipped with an **additional socket housing** (e.g. 30-pin), **which was not provided on the previous vehicle-side wiring harness**. This socket housing also cannot be found in the wiring diagram.

Procedure

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **in the vehicle interior** (in the footwell, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.
- Alternatively, a suitable pin housing can be fitted on the vehicle-side wiring harness and connected to the additional socket housing.

However, this is permitted only if the following conditions are met:

- Carpets must not protrude visibly or become deformed due to the installation of the additional plug connection.
- It must be possible to install the adjacent components (for example, trims, trim panels, etc.) correctly after installing the additional plug connection.
- All the attachment points of the adjacent components (for example, trims, trim panels, etc.) must engage correctly.
- There must be no rattling noise due to the installation of the additional plug connection.
- The additional plug connection must not damage the adjacent components/wiring harnesses, etc..

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **outside the vehicle interior** (in the wheel arch, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.



- **Using the additional socket housing is not permitted with a separation point outside the vehicle interior.**



00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



Warning!

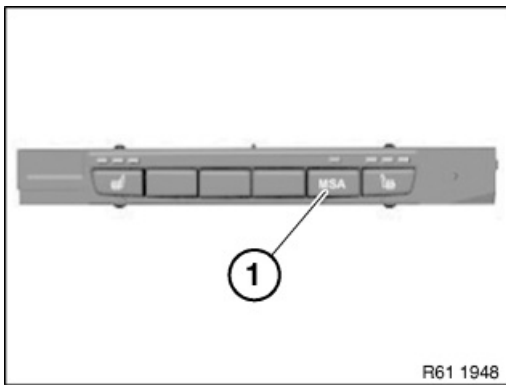
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

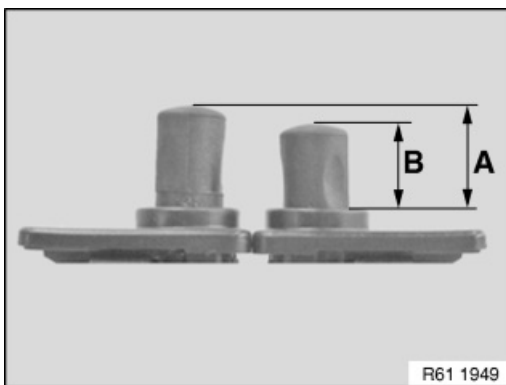
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode
 $A = 10 \text{ mm}$
 - Basic setting (engine hood/bonnet open)
 $B = 7 \text{ mm}$

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



When working with diagnosis tools:

- Observe instructions in diagnosis tool





Note:

For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) Service Information (bulletin) 61 01 07 335
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) Service Information (bulletin) 61 01 10 629



**Special tools required:**

- 13 5 270
- 11 4 310
- 11 5 364
- 13 3 060

**Attention!**

Lines are under pressure!

Wear safety goggles and gloves.

Fuel can emerge spontaneously at high velocity when the fuel line is released!

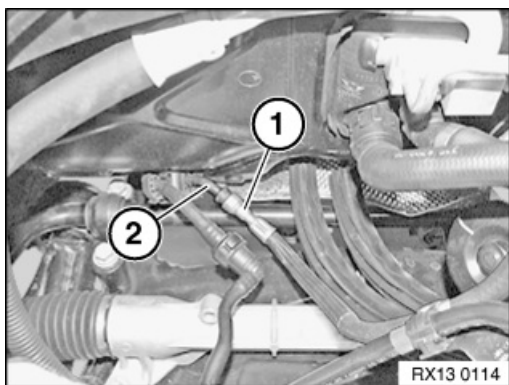
**Recycling:**

Catch and dispose of escaping fuel with auxiliary materials.

Observe country-specific waste disposal regulations.

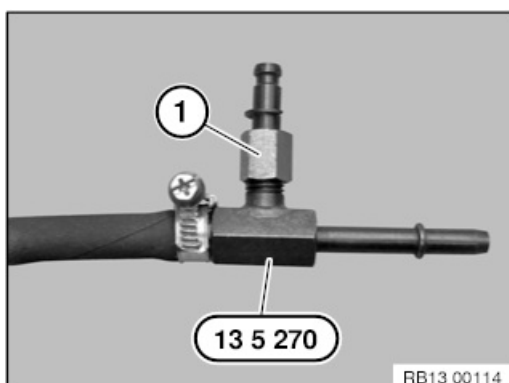
**Necessary preliminary tasks:**

- Connect MINI diagnosis system



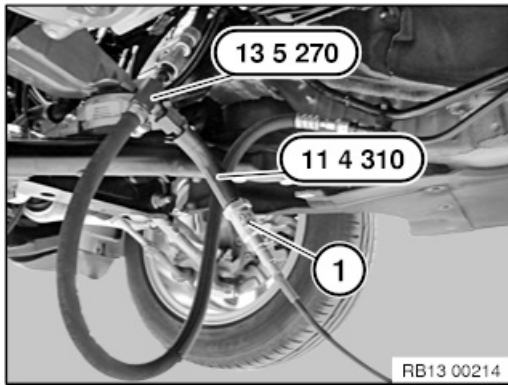
Installation location: Near the front axle anti-roll bar.

Unlock and disconnect fuel delivery line (1).



Unscrew adapter (1) from special tool 13 5 270 .





Insert special tool 13 5 270 into disconnected fuel line.

Screw onto special tool 13 5 270 , the special tool 11 4 310 .

Screw IMIB 100 bar pressure sensor (1) on the special tool 11 4 310 .

Note:

As an alternative to the 100 bar IMIB pressure sensor (1), the 25 bar pressure sensor can also be used. For this, screw on special tool 11 5 364 instead of special tool 11 4 310 onto special tool 13 5 270 . Or directly screw the pressure manometer from the set of special tools 13 3 060 onto the special tool 13 5 270 .

Establish fuel delivery pressure. Read off fuel delivery pressure on Integrated Measurement Interface Box and compare with the values in the MINI diagnosis system.



13 31 ... Notes regarding the fuel pressure test (reference pressure: surrounding area)

The characteristic of this version with ambient pressure:

The connection for the vacuum hose of the fuel pressure regulator is located between the throttle valve and the air cleaner and/or on the air cleaner.

Test prerequisite:

The correct fuel pressure regulator has been installed.

- Use the Electronic Parts Catalogue to check whether the correct fuel pressure regulator has been installed for the vehicle:

Connect test adapter.

The regulating function of the fuel pressure regulator must be ensured under all operating conditions. The fuel pump must always be able to generate a fuel pressure that is higher than the pressure that is adjusted by the pressure regulator.

The DME controls the injection period for which the injection rate is adjusted.

The fuel return line is depressurised at engine standstill and ignition key position 0. The pressure regulator will close at engine standstill and ignition key position 0. The fuel pressure in the feed will be maintained for an extended period of time. A non-return valve will close in the fuel pump. This measure will maintain the fuel pressure in the fuel system. Extended start times are thereby prevented.

- Let the engine run at idle and measure the fuel pressure.

When the measured value is less than the nominal value - 0.2 bar:

- The line cross-sections in the fuel feed are constricted or the fuel filter is plugged,
or
- The voltage supply to the fuel pump function is not OK: For example, as a result of high contact resistance (corrosion) in the plug connection between the wiring harness and the fuel pump.

When the measured value exceeds the nominal value + 0.2 bar:

- Stop the engine and then monitor the measured value.
- When the measured value drops to the nominal value, the line cross-sections in the fuel return line are constricted or plugged.
- Check the fuel lines for kinks.

If no kinks are visible:

- Replace the return lines.

When the measured value remains too high, the pressure regulator is most likely faulty.

Attention:

There is a low probability that the return line is completely closed due to obstruction. Fuel would then leak out under pressure when the pressure regulator is removed!

- Have a cleaning rag ready and catch and dispose of escaping fuel.
- Do not replace the pressure regulator. Replace the return line instead.
- Let the engine run briefly at idle and then stop the engine.
- Write down the measured value at engine standstill.
- Read the measured value again after about 20 to 30 minutes at engine standstill.

The following check requires special tool 13 3 010 (hose clip).

If the measured value dropped by more than 0.5 bar:

- Start the engine and wait briefly for stable pressure build-up



- Stop the engine and immediately disconnect the feed line just before the pressure gauge with special tool 13 3 010
- Write down the measured value
- Read the measured value again after about 20 to 30 minutes at engine standstill

The following faults may be present if the measured value now dropped less than 0.5 bar:

- Fault in the feed lines
- Fault in the internal tank feed hose
- Faulty pressure-maintaining stop valve in the fuel pump

Check components. Replace faulty components.

If the measured value dropped again by more than 0.5 bar:

- Replace the pressure regulator
-
- All fuel hoses and their hose clamps that were loosened during the checks must be replaced.
 - Read out fault memory of DME control unit. Check stored fault messages. Rectify fault. Clear diagnostic fault entries from fault memory.



**Special tools required:**

- 13 0 250
- 13 5 161
- 13 5 162
- 32 1 270

**Warning!**

Disconnect negative battery terminal (risk of fire due to short circuit on dismantling).

Carry out installation work on fuel system only with coolant temperature below 40 °C.

**Important!**

Wear protective face mask.

Fuel can emerge spontaneously at high speed when the fuel delivery line is released!

**Important!**

Adhere to conditions of absolute cleanliness when performing repair work on the fuel system.

Introduced contaminants can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system
- Remove all traces of dirt contamination before dismantling lines or separate components
- Use only fluff-free cloths
- Seal all fuel system openings with protective caps or plugs

**Important!**

When working on the oil, coolant or fuel circuit, you must protect the alternator against dirt contamination.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

**Necessary preliminary tasks:**

- remove sound generator



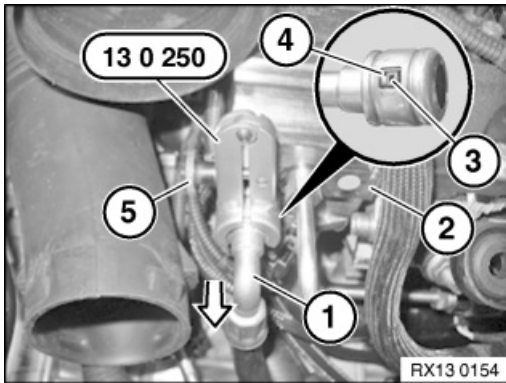


Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.



Procedure up to production date 03/2012 (Continental high pressure pump):

Place special tool 13 0 250 on fuel delivery line (1), positioning retaining lugs of tool in recesses in quick-release coupling (4).

Secure special tool 13 0 250 by means of knurled screw (5).

Warning!

Place a cloth over fuel delivery line (1) and high pressure pump (2).

To unlock, push fuel delivery line (1) towards high pressure pump (2), then detach in direction of arrow.

Remove special tool 13 0 250 and cloth.

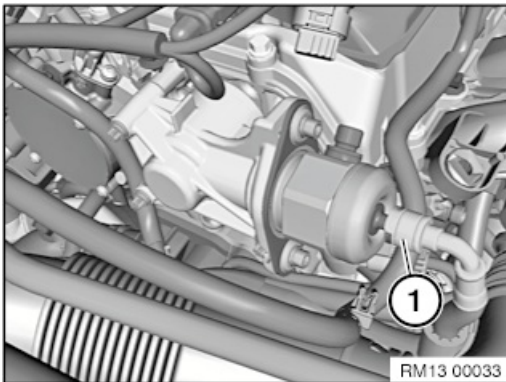
Close off fuel line connection of high pressure pump with a matching plug from special tool set 32 1 270 .

Close off fuel delivery line with special tool 13 5 161 .

Installation note:

Retaining lugs of lock must not be damaged. A fuel line with damaged retaining lugs must be replaced.

Fuel delivery line (1) must snap audibly into place.



Procedure from production date 03/2012 (Bosch high pressure pump):

Place special tool 13 0 250 on the fuel delivery line (1) and position the retaining lugs of the tool in the recesses of the quick-release coupling.

Fix special tool 13 0 250 using the knurled screw.

Warning!

Place a cloth over the fuel delivery line and high pressure pump.

To unlock the fuel delivery line (1), slide it towards the high pressure pump then pull it off.

Remove special tool 13 0 250 and cloth.

Plug the fuel line connection of the high pressure pump with the correct plug.

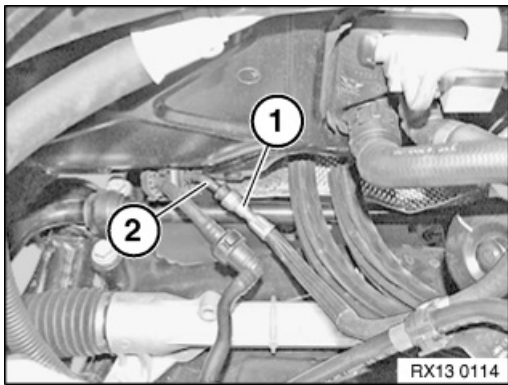
Close off fuel delivery line with special tool 13 5 161 .

Installation note:

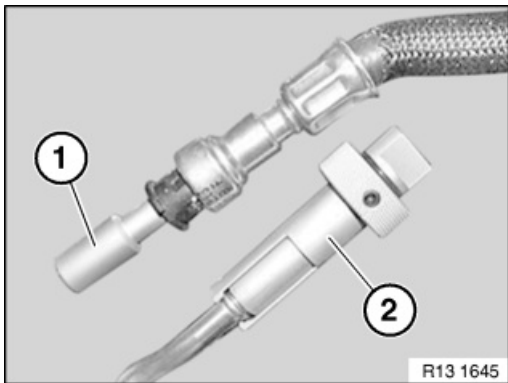
Retaining lugs of lock must not be damaged. A fuel line with damaged retaining lugs must be replaced.

Fuel delivery line must snap audibly into place.

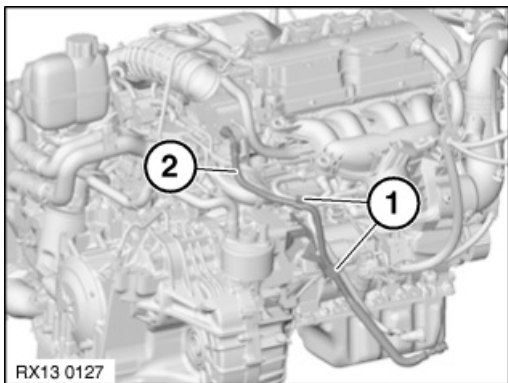




Unlock and disconnect fuel delivery line (1).
Close off fuel line (2) with special tool 13 5 162 .



Close off fuel delivery line with special tools (1) 13 5 161
and (2) 13 5 162 .



Unlock retaining tabs (1) and remove fuel delivery line (2). *Installation note:*
Ensure the fuel delivery line (2) is installed correctly (no chafing points).
Make sure retaining tabs (1) latch correctly.



Assemble engine.
Check fuel system for tightness.
Check function of DME.



13 31 035 Removing and installing/replacing the fuel feed line

PRELIMINARY WORK

1 – Disconnecting the battery earth lead

Prerequisite

Ignition is switched off.



RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.



TECHNICAL INFORMATION

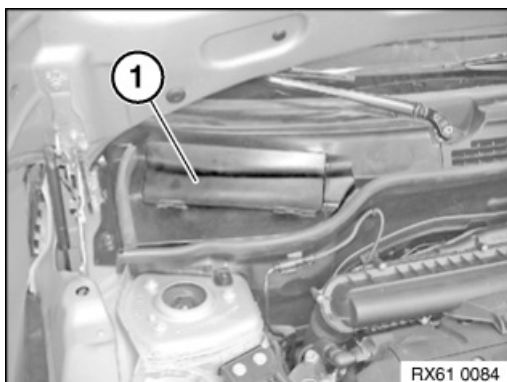
Observe the notes on handling the vehicle battery.

For additional information see:

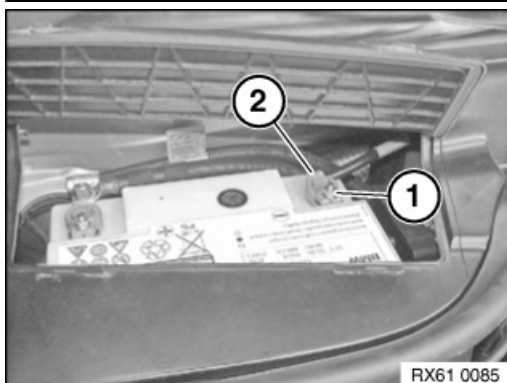
61 00 ... Safety information on handling the vehicle battery

61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery

61 12 ... Notes on the intelligent battery sensor (IBS)



- Open the cover (1).

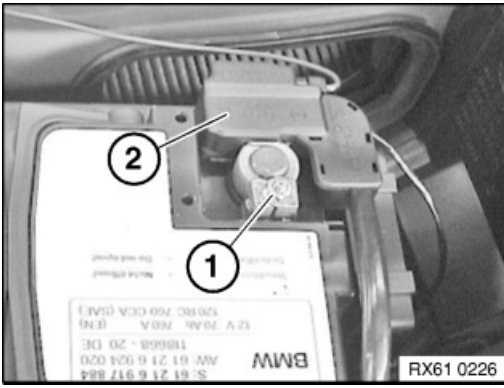


- **Equipment specification without the intelligent battery sensor (IBS):**

Slacken nut (1).

Remove the battery earth lead (2) and secure to one side.





- **Equipment specification with the intelligent battery sensor (IBS):**

Slacken nut (1).

Remove the battery earth lead (2) and secure to one side.

MAIN WORK

2 – Removing the fuel delivery line on the high pressure pump (production date up to 03/2012, Continental high pressure pump N18)



WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.



WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.



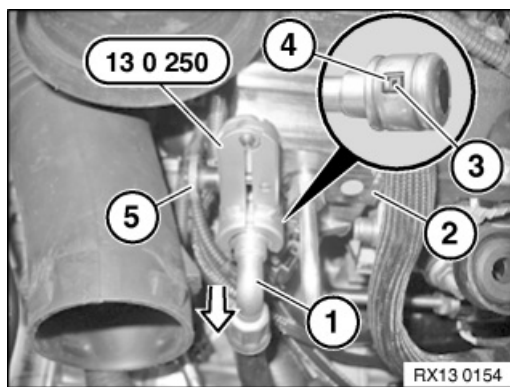
CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.



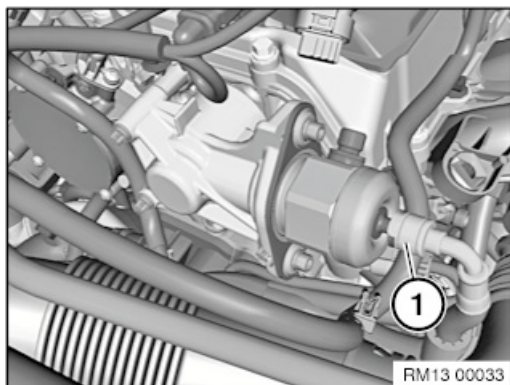


- Position special tool [0 496 242 \(13 0 250\)](#) on the fuel delivery line (1).
- Position the retaining lug of the tool in the recess of the quick-release coupling (4).
- Secure special tool [0 496 242 \(13 0 250\)](#) by means of knurled screw (5).

Place a cloth over fuel delivery line (1) and high pressure pump (2).

- To unlock, push fuel delivery line (1) towards high pressure pump (2), then detach in direction of arrow.
- Remove special tool [0 496 242 \(13 0 250\)](#) and cloth.
- Close off fuel line connection of high pressure pump with a matching plug from set of special tools [0 494 179 \(32 1 270\)](#). Seal the fuel delivery line using special tool [0 496 567 \(13 5 161\)](#) 13 5 161.

3 – Installing the fuel delivery line on the high pressure pump (production date from 03/2012, Bosch high pressure pump N18)



- Check the retaining lugs of the lock for damage.
- Fuel lines with damaged retaining lugs must be renewed.
- Remove the plug from the fuel line connection of the high pressure pump.
- Loosen the knurled screw and remove special tool [0 496 242 \(13 0 250\)](#).
- Push the fuel delivery lines (1) towards the connection for the high pressure pump (2) and lock them.

The retaining lugs at the quick-release coupling of the fuel delivery lines must engage audibly.



4 – Connecting the battery earth lead



RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.

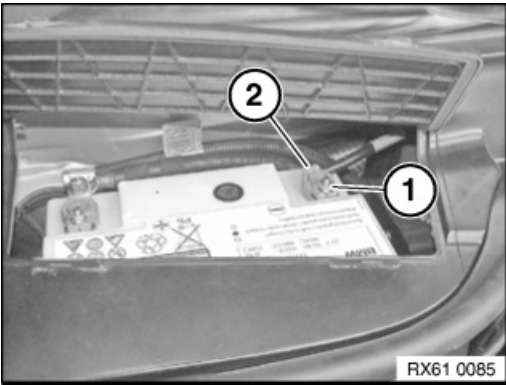


TECHNICAL INFORMATION

Observe the notes on handling the vehicle battery.

For additional information see:

- 61 00 ... Safety information on handling the vehicle battery
- 61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery
- 61 12 ... Notes on the intelligent battery sensor (IBS)



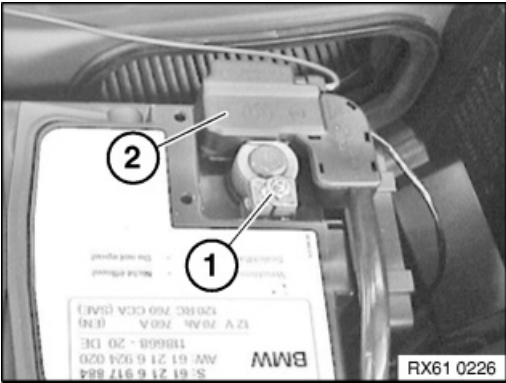
- **Equipment specification without the intelligent battery sensor (IBS):**

Place the battery earth lead (2) on the negative battery terminal.

Tighten nut (1).

Battery terminal

	5 Nm
--	------



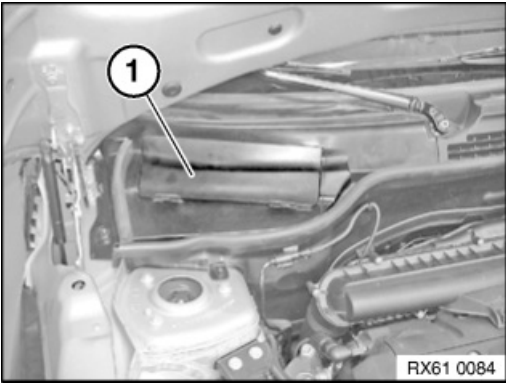
- **Equipment specification with the intelligent battery sensor (IBS):**

Place the battery earth lead (2) on the negative battery terminal.

Tighten nut (1).

Battery terminal

	5 Nm
--	------



- Close the cover (1).



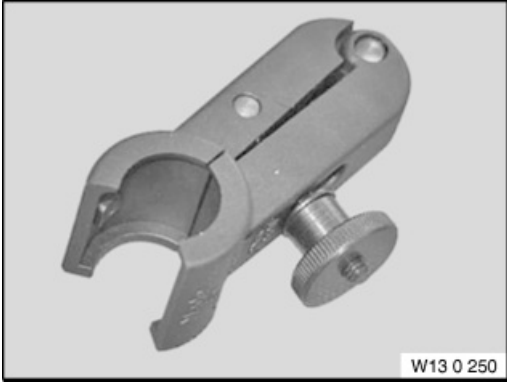
Additional Information

Overview of Tightening Torques

Battery terminal	Used in step 4
	5 Nm

Overview of Special Tools

0 496 242 (13 0 250) Release tool



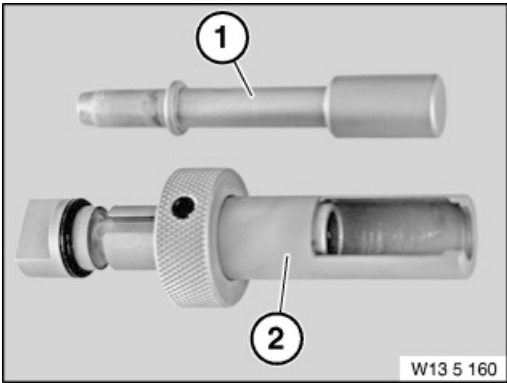
Common	Used in step 23
Usage	For unlocking high-pressure line.
Included in the tool or work	
Storage location	C86
Replaced by	
In connection with	
SI-Number	01 14 07 (389)

0 494 179 (32 1 270) Plug



Common	Used in step 2
Usage	(Plugs (set)) 27-piece, 3x per size - For sealing off hydraulic lines for brakes, steering etc.
Included in the tool or work	
Storage location	individual
Replaced by	
In connection with	
SI-Number	01 14 01 (766)

0 496 567 (13 5 161) Fastener



Common	Used in step 2
Usage	(Cap (2 piece)) For sealing the quick connectors Deletion, only available via tool set
Included in the tool or work	0 496 565
Storage location	
Replaced by	
In connection with	
SI-Number	



13 31 035 Removing and installing/replacing the fuel feed line

PRELIMINARY WORK

1 – Disconnecting the battery earth lead

Prerequisite

Ignition is switched off.



RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.



TECHNICAL INFORMATION

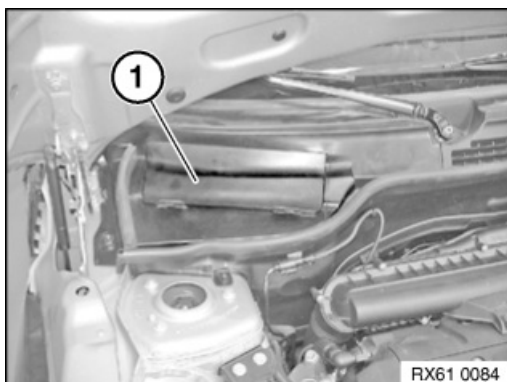
Observe the notes on handling the vehicle battery.

For additional information see:

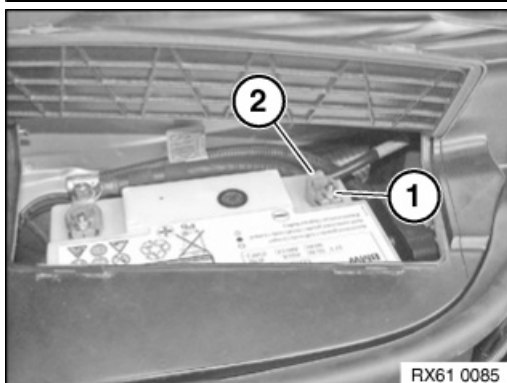
61 00 ... Safety information on handling the vehicle battery

61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery

61 12 ... Notes on the intelligent battery sensor (IBS)



- Open the cover (1).

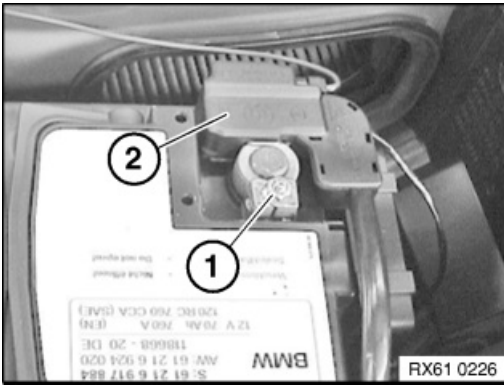


- **Equipment specification without the intelligent battery sensor (IBS):**

Slacken nut (1).

Remove the battery earth lead (2) and secure to one side.





- **Equipment specification with the intelligent battery sensor (IBS):**

Slacken nut (1).

Remove the battery earth lead (2) and secure to one side.

MAIN WORK

2 – Removing the fuel delivery line on the high pressure pump (production date up to 03/2012, Continental high pressure pump N18)



WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.



WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.



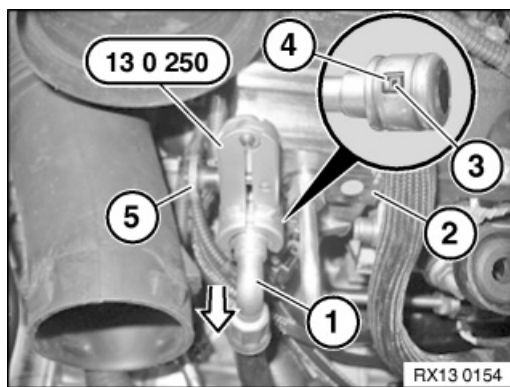
CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.





- Position special tool [0 496 242 \(13 0 250\)](#) on the fuel delivery line (1).
- Position the retaining lug of the tool in the recess of the quick-release coupling (4).
- Secure special tool [0 496 242 \(13 0 250\)](#) by means of knurled screw (5).

Place a cloth over fuel delivery line (1) and high pressure pump (2).

- To unlock, push fuel delivery line (1) towards high pressure pump (2), then detach in direction of arrow.
- Remove special tool [0 496 242 \(13 0 250\)](#) and cloth.
- Close off fuel line connection of high pressure pump with a matching plug from set of special tools [0 494 179 \(32 1 270\)](#). Seal the fuel delivery line using special tool [0 496 567 \(13 5 161\)](#) 13 5 161.

3 – Removing the fuel delivery line on the high pressure pump (production date up to 03/2012, Continental high pressure pump N18)



WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.



WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.



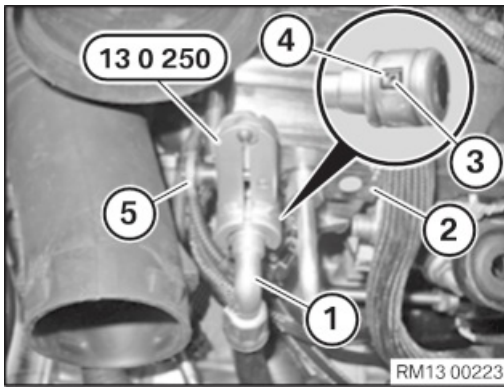
CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.





- Check the retaining lugs of the lock for damage.
- Fuel lines with damaged retaining lugs must be renewed.
- Remove the plug from the fuel line connection of the high pressure pump.
- Remove the plug from the fuel delivery line.
- Loosen the knurled screw (5) and remove special tool [0 496 242 \(13 0 250\)](#).
- Push the fuel delivery line (1) towards the high pressure pump connection (2) and lock it.

The retaining lugs (3) at the quick-release coupling (4) of the fuel delivery lines must engage audibly.



4 – Connecting the battery earth lead

RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.

TECHNICAL INFORMATION

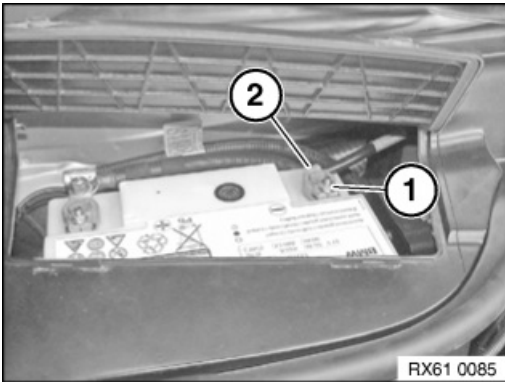
Observe the notes on handling the vehicle battery.

For additional information see:

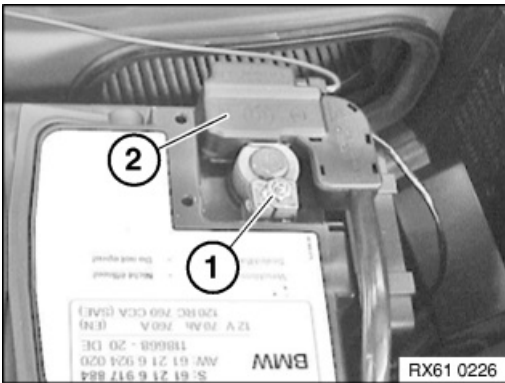
61 00 ... Safety information on handling the vehicle battery

61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery

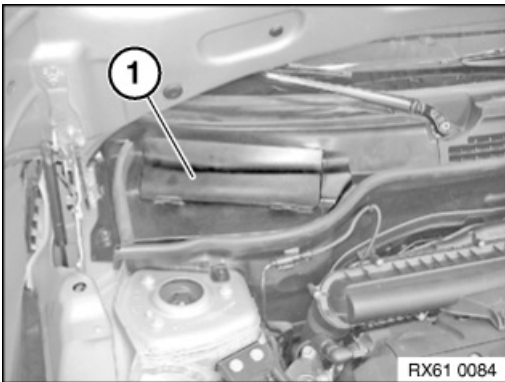
61 12 ... Notes on the intelligent battery sensor (IBS)



- **Equipment specification without the intelligent battery sensor (IBS):**
Place the battery earth lead (2) on the negative battery terminal.
Tighten nut (1).
- | | |
|-------------------------|------|
| Battery terminal | 5 Nm |
|-------------------------|------|



- **Equipment specification with the intelligent battery sensor (IBS):**
Place the battery earth lead (2) on the negative battery terminal.
Tighten nut (1).
- | | |
|-------------------------|------|
| Battery terminal | 5 Nm |
|-------------------------|------|



- Close the cover (1).



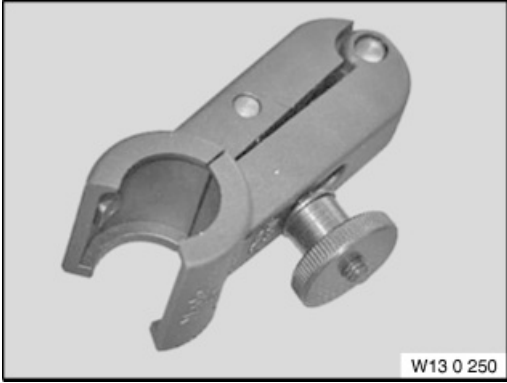
Additional Information

Overview of Tightening Torques

Battery terminal	Used in step 4
	5 Nm

Overview of Special Tools

0 496 242 (13 0 250) Release tool



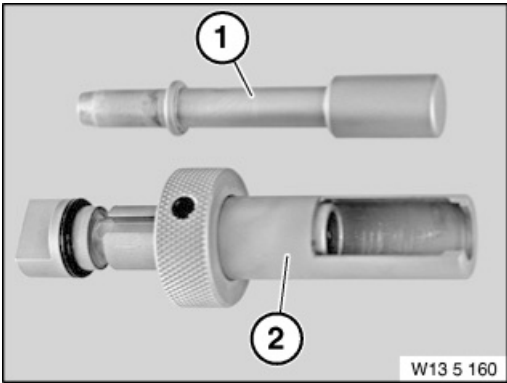
Common	Used in step 23
Usage	For unlocking high-pressure line.
Included in the tool or work	
Storage location	C86
Replaced by	
In connection with	
SI-Number	01 14 07 (389)

0 494 179 (32 1 270) Plug



Common	Used in step 2
Usage	(Plugs (set)) 27-piece, 3x per size - For sealing off hydraulic lines for brakes, steering etc.
Included in the tool or work	
Storage location	individual
Replaced by	
In connection with	
SI-Number	01 14 01 (766)

0 496 567 (13 5 161) Fastener



Common	Used in step 2
Usage	(Cap (2 piece)) For sealing the quick connectors Deletion, only available via tool set
Included in the tool or work	0 496 565
Storage location	
Replaced by	
In connection with	
SI-Number	



13 51 ... Checking temperature compensator on high pressure pump (Continental) (N14, N18)



Special tools required:

- 2 344 569

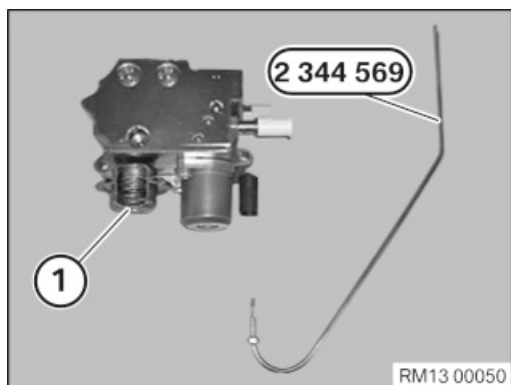


The (Continental) high pressure pump is in principle a piston diaphragm pump. Two pistons are operated by a swash plate. The oscillating movement of the piston is transferred over a special oil in the high pressure pump to diaphragms in the form of gaiters. These in turn set the fuel under pressure. The oil chamber in the housing of the high pressure pump is completely filled with oil. As the oil expands when heated, this would impair the function. To ensure the high pressure pump can work correctly in all thermal conditions there is a temperature compensator on the housing. It consists of a spring-loaded diaphragm. When the special oil now escapes due to leakage and this causes the impairment to the function of high pressure pump, any lack of oil in the high pressure pump can be checked at the temperature compensator. Any lack of oil in the high pressure pump can not be topped up. It must be replaced if it is faulty.



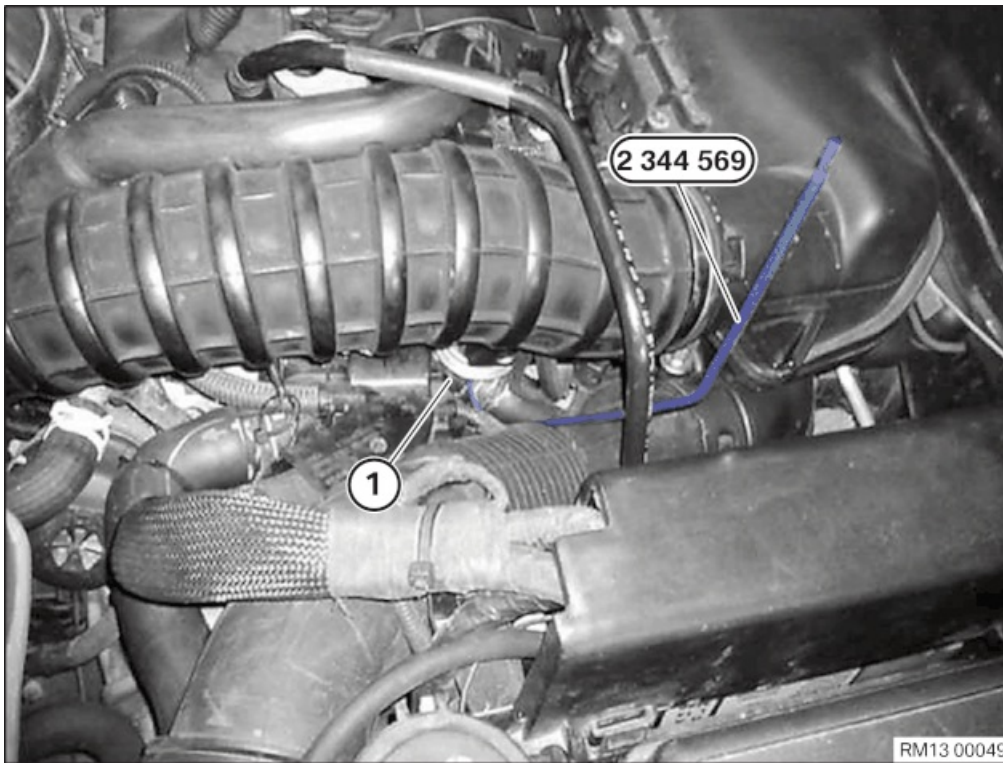
Note:

The engine should be cooled down to ensure a clear as possible measuring result.

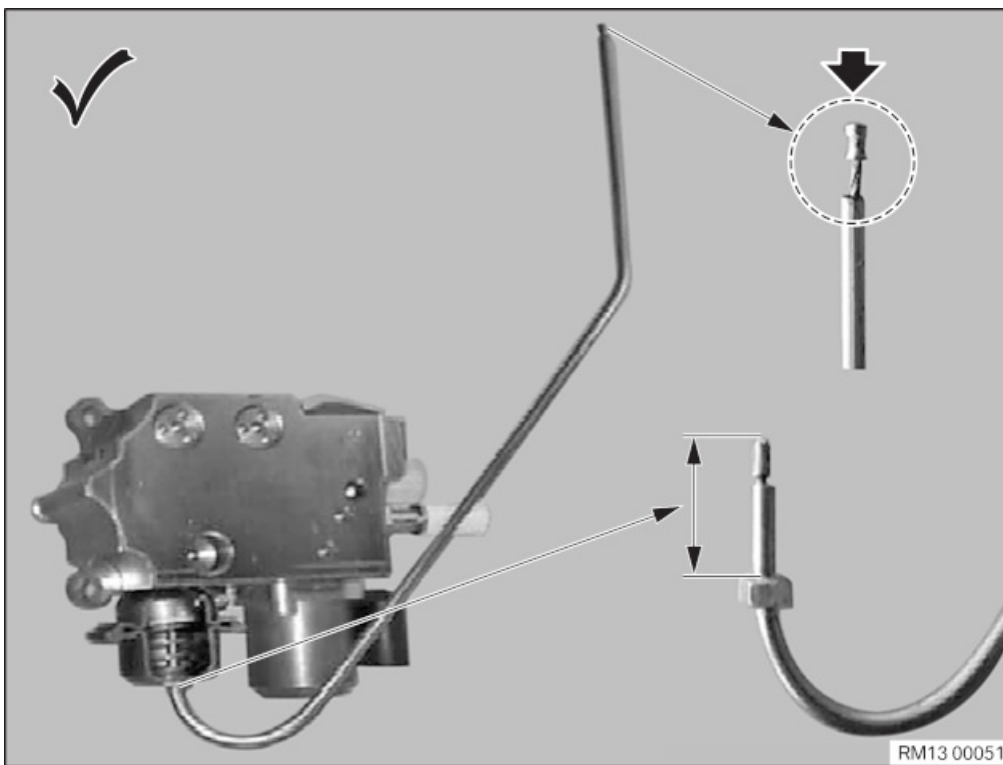


- Temperature compensator (1)
- Special tool 2 344 569



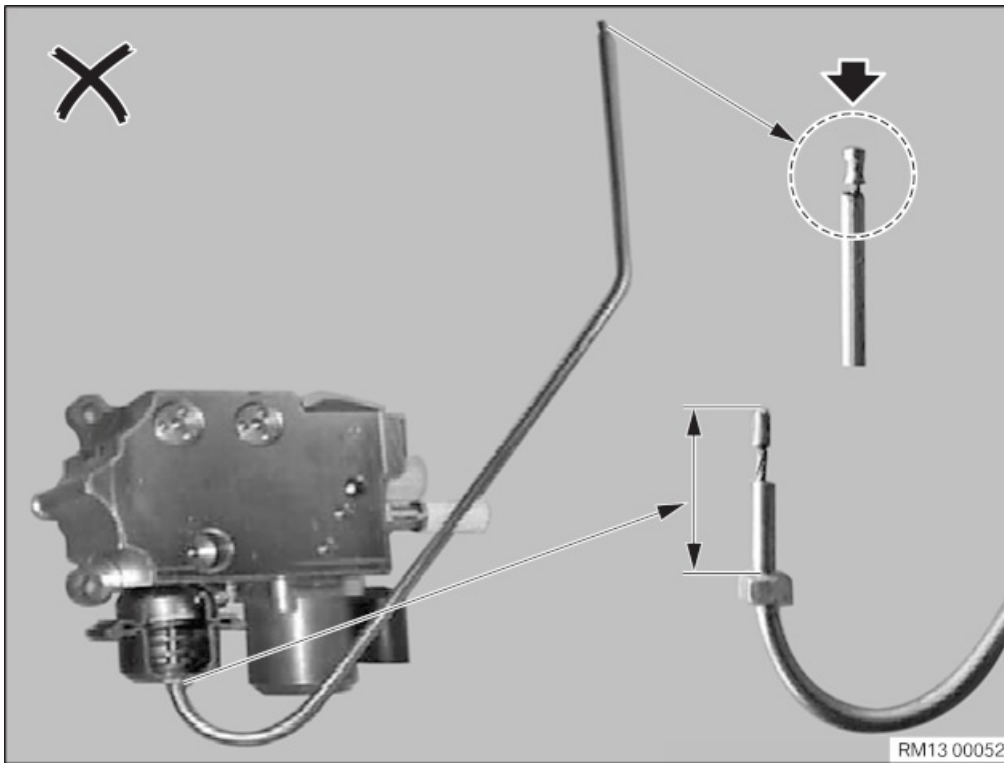


Insert special tool 2 344 569 into temperature compensator (1) **up to limit position**. *Note:* To avoid incorrect measurements, keep the top, straight part of the special tool as vertical as possible. Do not trap/crush lines/hoses in the vicinity of the high pressure pump.



Press down the pin using light finger force – without pushing the special tool away from the limit position. If the pin can **not** be completely pressed down, the result of this check is **OK**.





If the pin goes down, the result of this check is **not OK**.



For the **not OK** result, the dimension at the temperature compensator is again to be measured exactly with the depth gauge of the caliper gauge. (Remove fuel high pressure pump.)

- **OK** = less than 26 mm
- **Not OK** = greater than 26 mm



**Warning!**

- Risk of burning!
- Rotating components (risk of injury!)

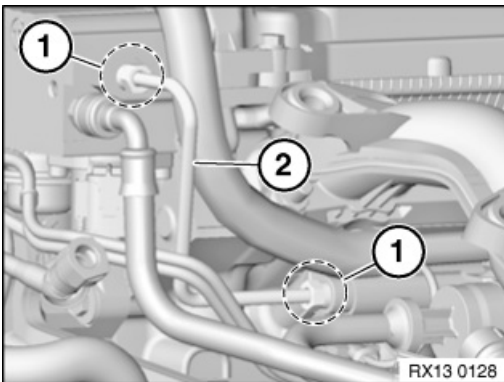
**Necessary preliminary work:**

- Remove intake silencer housing.
- Bring engine up to operating temperature.

**Important!**

Air bubbles form continuously in the event of a leak!

Static air bubbles indicate that there is no leak. They may be caused by the leak detector spray or when the leak detector agent liquifies.



Picture shows N14

Apply leak detector spray* in area of screw connection (1) of pressure line (2).

* Sourcing reference: BMW Parts Department

Repeat procedure several times and check for bubbles with telescopic mirror in the entire screw connection area (1).

**Note:**In case of tightness:

- Assemble engine
- Read out fault memory, clear if necessary.

In event of leakage:

- Replace **both components** at leak
- Repeat leak test after replacing components



13 51 017 Removing and installing high pressure pump

PRELIMINARY WORK

1 – Disconnecting the battery earth lead

Prerequisite

Ignition is switched off.



RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.



TECHNICAL INFORMATION

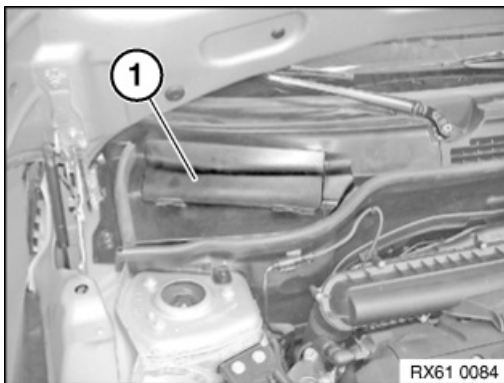
Observe the notes on handling the vehicle battery.

For additional information see:

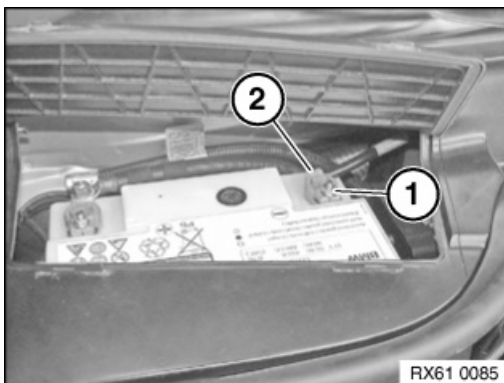
61 00 ... Safety information on handling the vehicle battery

61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery

61 12 ... Notes on the intelligent battery sensor (IBS)



- Open the cover (1).

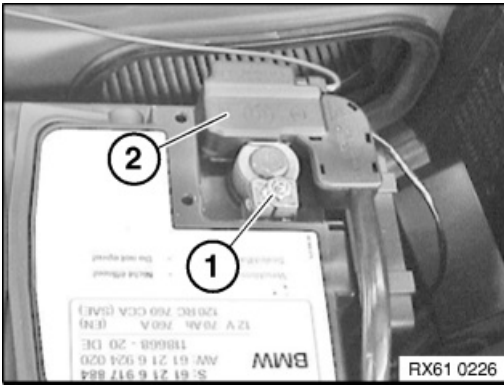


- **Equipment specification without the intelligent battery sensor (IBS):**

Slacken nut (1).

Remove the battery earth lead (2) and secure to one side.





- **Equipment specification with the intelligent battery sensor (IBS):**

Slacken nut (1).

Remove the battery earth lead (2) and secure to one side.

2 – Remove the high pressure line (production date as from 03/2012 Bosch high pressure pump N18)



WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.



WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.



WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.



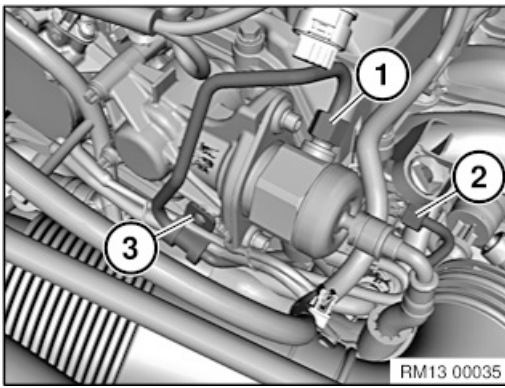
CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.





- Unfasten nut (1).
- Loosen nut (2).
- Loosen screw (3).
- Seal the rail and the high pressure pump using a matching plug (1) from the set of special tools [0 494 179 \(32 1 270\)](#) 32 1 270.
- Feed out and remove high pressure line.

3 – Removing the fuel delivery line on the high pressure pump (production date from 03/2012, Bosch high pressure pump N18)



WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.



WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.



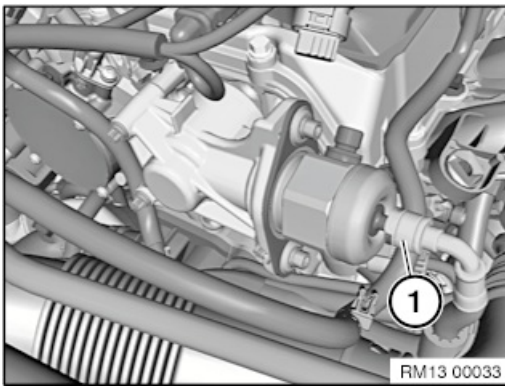
CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.





- Position special tool [0 496 242 \(13 0 250\)](#) on the fuel delivery line (1).
- Position the retaining lugs of the tool in the recess of the quick-release coupling.
- Fix special tool [0 496 242 \(13 0 250\)](#) using the knurled screw.

Place a cloth over the fuel delivery line and high pressure pump.

- To unlock the fuel delivery line (1), slide it towards the high pressure pump then pull it off.
- Remove special tool [0 496 242 \(13 0 250\)](#) and cloth.
- Plug the fuel line connection of the high pressure pump with the correct plug.
- Close off fuel delivery line with special tool [0 496 567 \(13 5 161\)](#).

MAIN WORK

4 – Removing the high pressure pump (production date from 03/2012, Bosch N18)



WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.



WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.



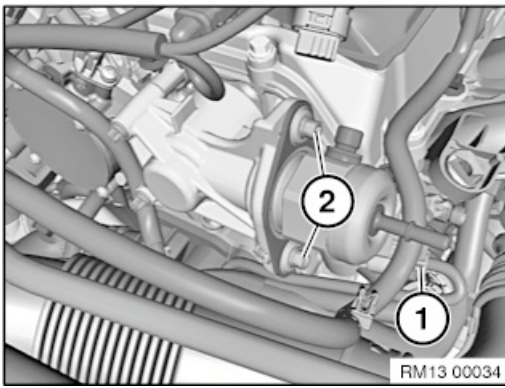
WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.





- Unlock connector (1) and pull off.
- Loosen screws (2).
- Remove the high pressure pump and make sure that the pump tappet does not fall out.

Engine oil can escape when pump is detached; have a cleaning cloth ready.

5 – Installing the high pressure pump (production date from 03/2012, Bosch N18)



WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.



WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.



WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

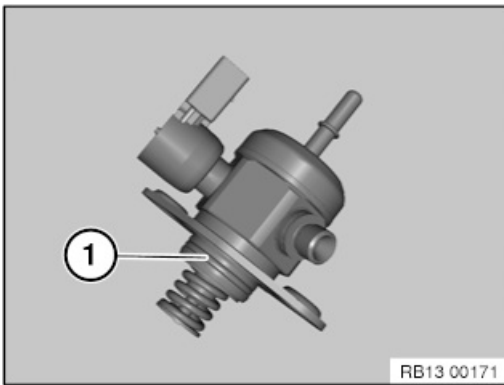
- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.



TECHNICAL INFORMATION

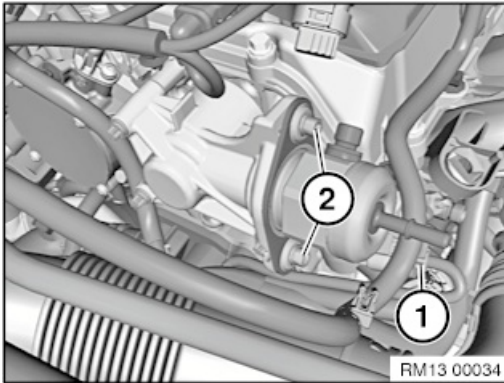
Bonding surfaces must be dry and free of dust and grease. After the adhesive area has been cleaned, it must no longer be touched with bare hands.





- Renew gasket (1).

Parts: Gasket



- Turn the cam of the high-pressure pump drive to the BDC position before installing the high pressure pump.
- To do this, twist the engine if necessary in the direction of engine rotation to the central bolt of the crankshaft.

- Install high pressure pump.

- Renew screws (2).

Parts: Bolts

- Position the screws (2) and tighten them alternately in 90° increments.

High pressure pump

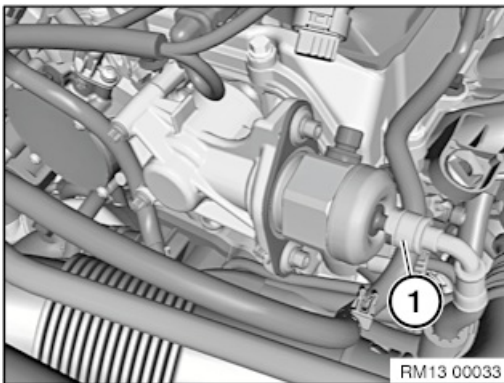
Renew screws.

12 Nm

- Connect connectors (1) and lock.

POSTPROCESSES

6 – Installing the fuel delivery line on the high pressure pump (production date from 03/2012, Bosch high pressure pump N18)



- Check the retaining lugs of the lock for damage.
- Fuel lines with damaged retaining lugs must be renewed.
- Remove the plug from the fuel line connection of the high pressure pump.
- Loosen the knurled screw and remove special tool [0 496 242 \(13 0 250\)](#).
- Push the fuel delivery lines (1) towards the connection for the high pressure pump (2) and lock them.

The retaining lugs at the quick-release coupling of the fuel delivery lines must engage audibly.

7 – Install the high pressure line (production date as from 03/2012 Bosch high pressure pump N18)



WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.





WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.

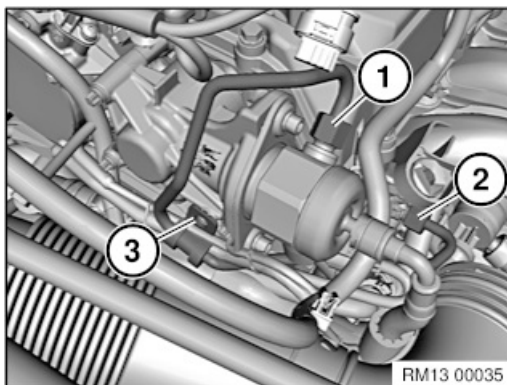


CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.



• **Strictly adhere to the following sequence:**

1. Insert the high pressure line.
2. Apply nuts (1) and (2) hand-tight.
3. Tighten screw (3) on the retaining clip.
4. Tighten the nut (2) on the high-pressure rail.
5. Tighten the nut (1) on the high pressure pump.
6. Check fuel system for tightness.

High-pressure pipe

Coupling nut		30 Nm
Screw for retaining clip		8 Nm

8 – Connecting the battery earth lead



RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.



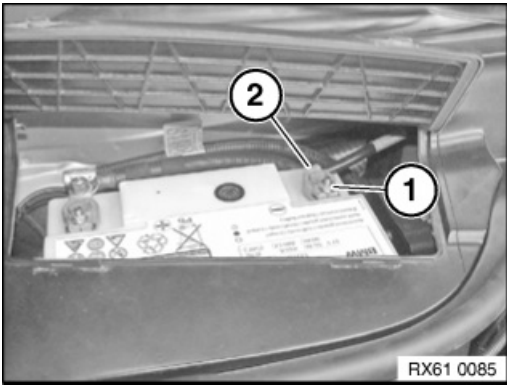
TECHNICAL INFORMATION

Observe the notes on handling the vehicle battery.

For additional information see:

- 61 00 ... Safety information on handling the vehicle battery
- 61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery
- 61 12 ... Notes on the intelligent battery sensor (IBS)

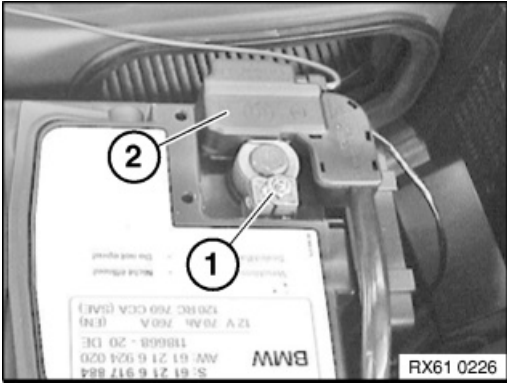




- **Equipment specification without the intelligent battery sensor (IBS):**
Place the battery earth lead (2) on the negative battery terminal.
Tighten nut (1).

Battery terminal

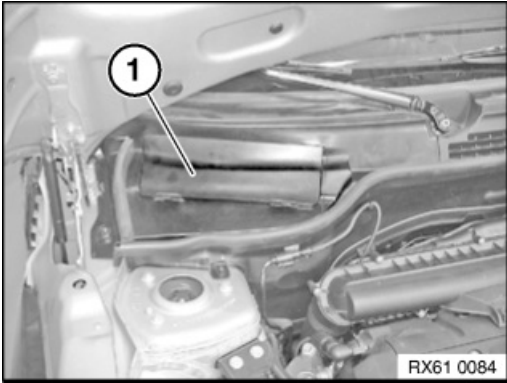
	5 Nm
--	------



- **Equipment specification with the intelligent battery sensor (IBS):**
Place the battery earth lead (2) on the negative battery terminal.
Tighten nut (1).

Battery terminal

	5 Nm
--	------



- Close the cover (1).

Additional Information

Overview of Tightening Torques

High pressure pump		Used in step	5
Renew screws.			12 Nm
High-pressure pipe		Used in step	7
Coupling nut			30 Nm
Screw for retaining clip			8 Nm
Battery terminal		Used in step	8
			5 Nm

Overview of Special Tools



0 494 179 (32 1 270) Plug

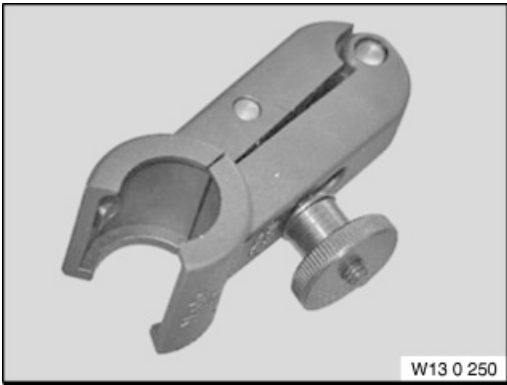


Common

Used in step 2

Usage	(Plugs (set)) 27-piece, 3x per size - For sealing off hydraulic lines for brakes, steering etc.
Included in the tool or work	
Storage location	individual
Replaced by	
In connection with	
SI-Number	01 14 01 (766)

0 496 242 (13 0 250) Release tool

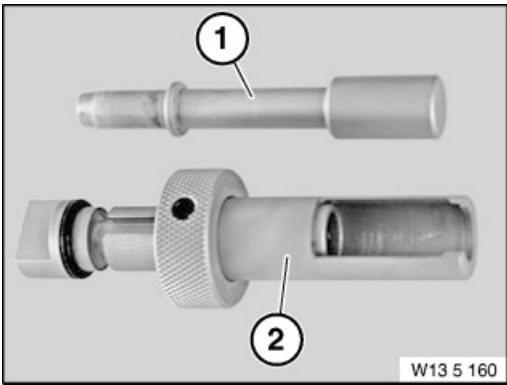


Common

Used in step 36

Usage	For unlocking high-pressure line.
Included in the tool or work	
Storage location	C86
Replaced by	
In connection with	
SI-Number	01 14 07 (389)

0 496 567 (13 5 161) Fastener



Common

Used in step 3

Usage	(Cap (2 piece)) For sealing the quick connectors Deletion, only available via tool set
Included in the tool or work	0 496 565
Storage location	
Replaced by	
In connection with	
SI-Number	



13 51 017 Removing and installing high pressure pump

PRELIMINARY WORK

1 – Removing the fuel delivery line on the high pressure pump (production date up to 03/2012, Continental high pressure pump N18)



WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.



WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.

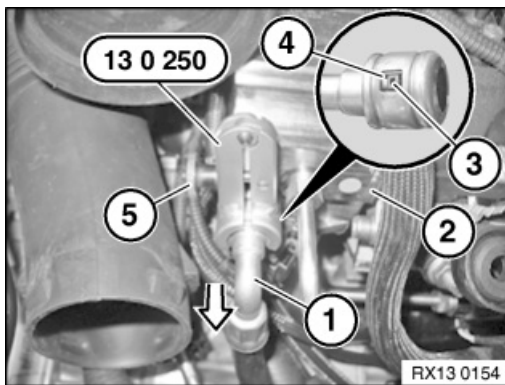


CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.



- Position special tool [0 496 242 \(13 0 250\)](#) on the fuel delivery line (1).
- Position the retaining lug of the tool in the recess of the quick-release coupling (4).
- Secure special tool [0 496 242 \(13 0 250\)](#) by means of knurled screw (5).
- **Place a cloth over fuel delivery line (1) and high pressure pump (2).**
- To unlock, push fuel delivery line (1) towards high pressure pump (2), then detach in direction of arrow.
- Remove special tool [0 496 242 \(13 0 250\)](#) and cloth.
- Close off fuel line connection of high pressure pump with a matching plug from set of special tools [0 494 179 \(32 1 270\)](#). Seal the fuel delivery line using special tool [0 496 567 \(13 5 161\)](#) 13 5 161.

2 – Remove the high pressure line (production date up to 03/2012, continental high pressure pump N18)





WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.



WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.



WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.

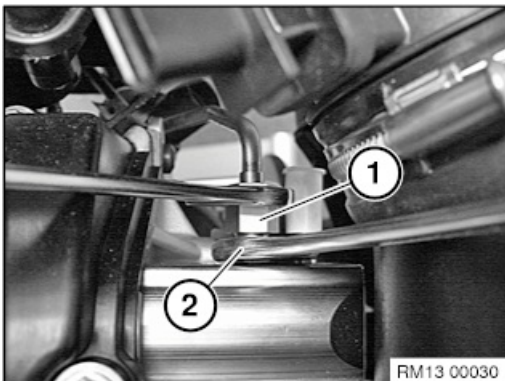


CAUTION

On releasing high pressure line, fuel may emerge at high speed.

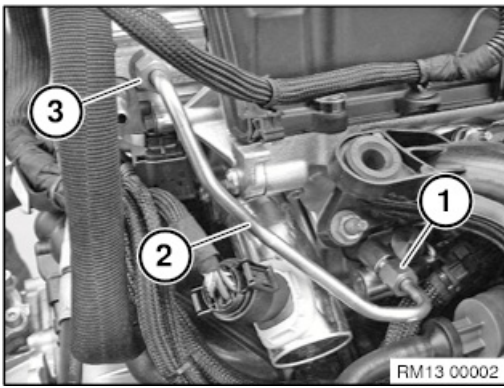
Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

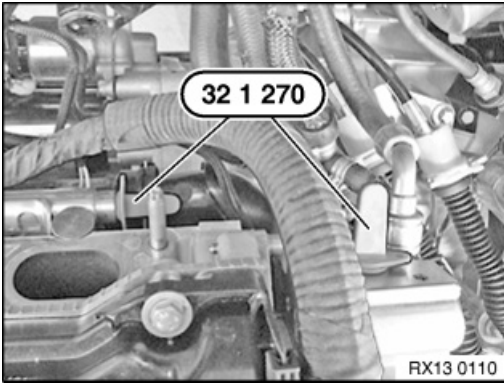


- When releasing the high pressure line (1) with an open-end spanner (2), hold the connector.





- Unfasten nut (1).
- Loosen nut (3).
- Remove high pressure line (2).



- Seal the rail and the high pressure pump using a matching plug (1) from the set of special tools [0 494 179 \(32 1 270\)](#).

MAIN WORK

3 – Removing the high pressure pump (production date up to 03/2012, Continental N18)



WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.



WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.



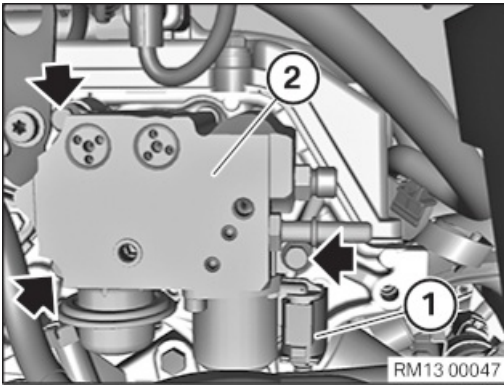
RISK OF DAMAGE

Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

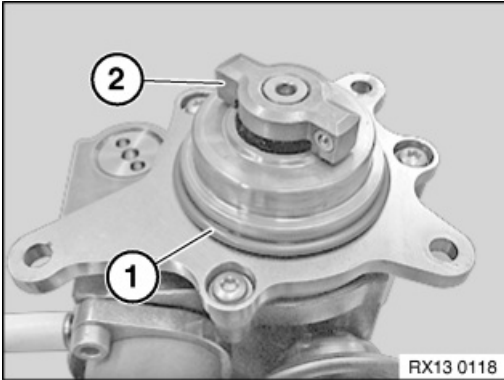




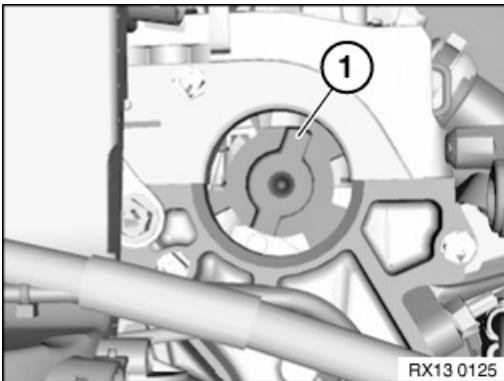
- Disconnect plug connection (1).
- Remove screws and dispose of.
- Detach high-pressure pump (2) and remove.

Engine oil can escape when pump is detached; have a cleaning cloth ready.

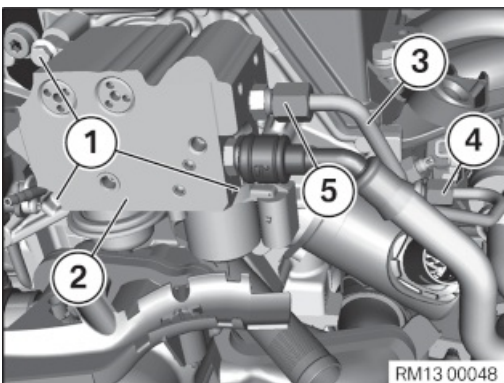
4 – Installing the high pressure pump (production date up to 03/2012, Continental N18)



- Clean the contact surface.
- Renew sealing ring (1).
- Rotate the high-pressure pump drive (2) to the correct installation position.



- Align the high pressure pump drive to the groove (1) of the intake camshaft.



- Replace screws (1).
- Apply the screws (1) of the high pressure pump (2) hand-tight.
The high pressure pump is moveable.
- Fit high pressure line (3) hand-tight. First fasten the nut (4) on the rail, then the nut (5) on the high pressure pump.
- Tighten the high pressure pump.

High pressure pump

Renew screws.

10 Nm

- Tighten the high pressure line (3).

POSTPROCESSES

5 – Removing the fuel delivery line on the high pressure pump (production date up to 03/2012, Continental high pressure pump N18)





WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.



WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.

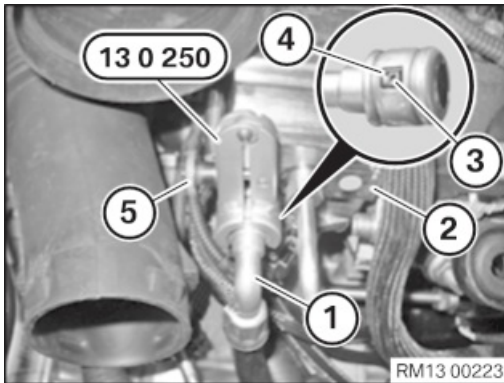


CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.



- Check the retaining lugs of the lock for damage.
- Fuel lines with damaged retaining lugs must be renewed.
- Remove the plug from the fuel line connection of the high pressure pump.
- Remove the plug from the fuel delivery line.
- Loosen the knurled screw (5) and remove special tool [0 496 242 \(13 0 250\)](#).
- Push the fuel delivery line (1) towards the high pressure pump connection (2) and lock it.

The retaining lugs (3) at the quick-release coupling (4) of the fuel delivery lines must engage audibly.

6 – Install the high pressure line (production date up to 03/2012 continental high pressure pump N18)



WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.





WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.

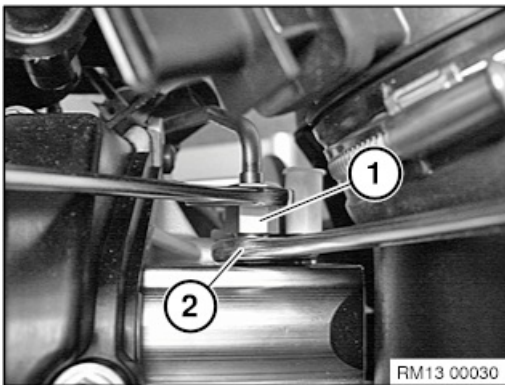


CAUTION

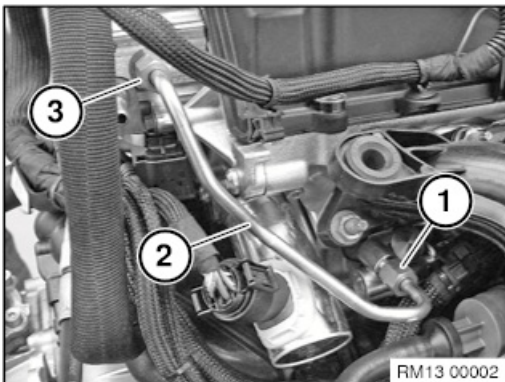
On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.



- When tightening the high pressure line (1) with an open-end spanner (2), hold the connector.



- **Strictly adhere to the following sequence:**

1. Insert the high pressure line (2).
2. Apply nuts (3) and (1) hand-tight.
3. First tighten nut (1), then nut (3).

High-pressure pipe

	26 Nm
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- Check fuel system for tightness.

Additional Information

Overview of Tightening Torques

High pressure pump

Used in step 4

Renew screws.

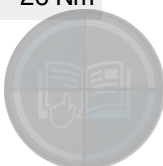
10 Nm

High-pressure pipe

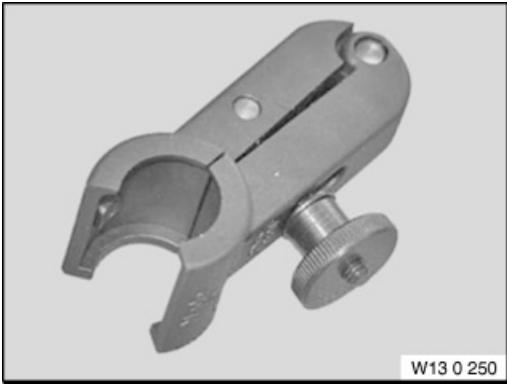
Used in step 6

26 Nm

Overview of Special Tools



0 496 242 (13 0 250) Release tool



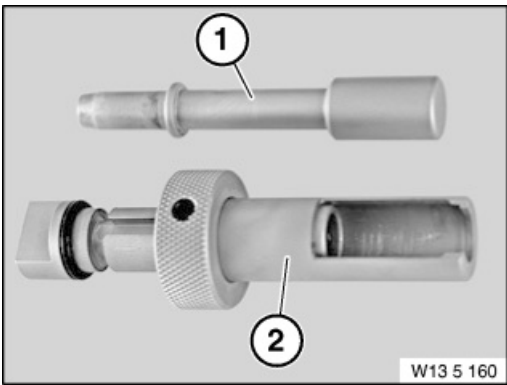
Common		Used in step	15
Usage	For unlocking high-pressure line.		
Included in the tool or work			
Storage location	C86		
Replaced by			
In connection with			
SI-Number	01 14 07 (389)		

0 494 179 (32 1 270) Plug



Common		Used in step	12
Usage	(Plugs (set)) 27-piece, 3x per size - For sealing off hydraulic lines for brakes, steering etc.		
Included in the tool or work			
Storage location	individual		
Replaced by			
In connection with			
SI-Number	01 14 01 (766)		

0 496 567 (13 5 161) Fastener



Common		Used in step	1
Usage	(Cap (2 piece)) For sealing the quick connectors Deletion, only available via tool set		
Included in the tool or work	0 496 565		
Storage location			
Replaced by			
In connection with			
SI-Number			



13 53 310 Removing and installing or replacing one fuel injector in fuel injection system (N18)



Special tools required:

- 13 0 191
- 13 0 192
- 13 0 193
- 13 0 194
- 13 0 195
- 13 0 231
- 13 0 232



Warning!

Disconnect battery negative terminal (risk of fire due to short-circuiting on removal)

Carry out installation work on fuel system only with coolant temperature below 40 °C.

Only perform this repair work on an engine that has cooled down.
Risk of burning!



Important!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Important!

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced dirt contamination can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.



Important!

Wear safety goggles.

Oil and dirt particles may get into your eyes!

After removing the injectors, clean the injector shafts with compressed air.





Necessary preliminary tasks:

- Remove high pressure rail.

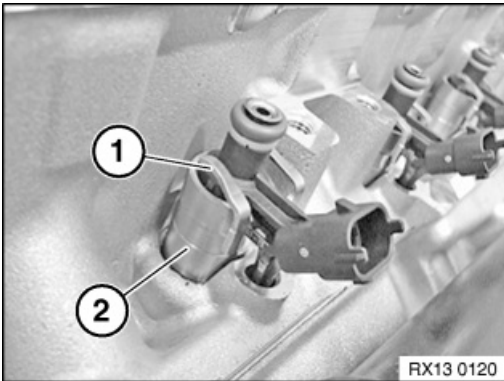


Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.



Removal:

Remove hold-down device (1) and discard.

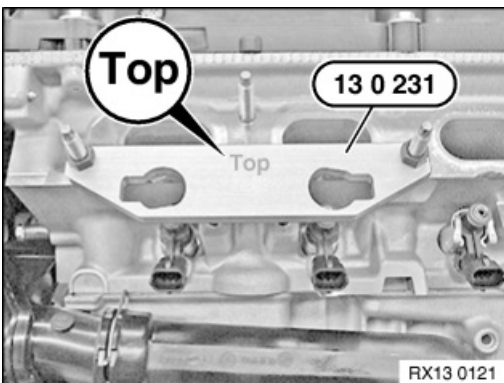
Pull up fuel injector (2) to remove.



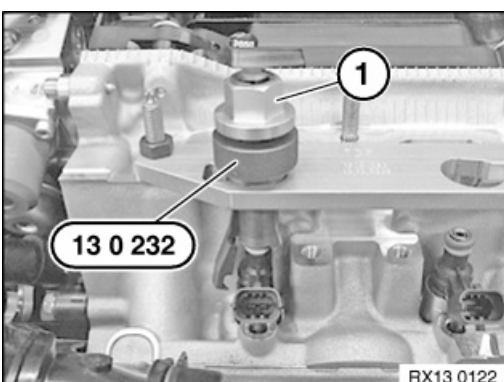
Procedure in event of stuck injectors: *Note:*

The following procedure applies to all injectors.

For purposes of clarity, illustration shows and description refers to the removed engine.



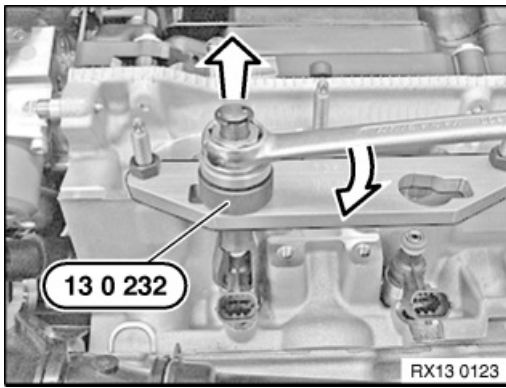
Mount special tool 13 0 231 with lettering "Top" facing upwards.



Mount special tool 13 0 232 .

To secure injector, turn nut (1) by hand until noticeable resistance is felt.





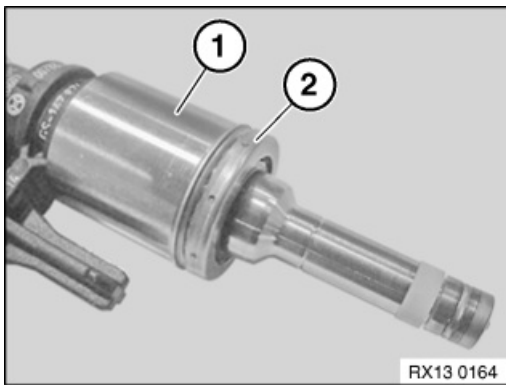
13 0 232 Turn nut on special tool several turns until injector has been released from hole.

Remove special tool.

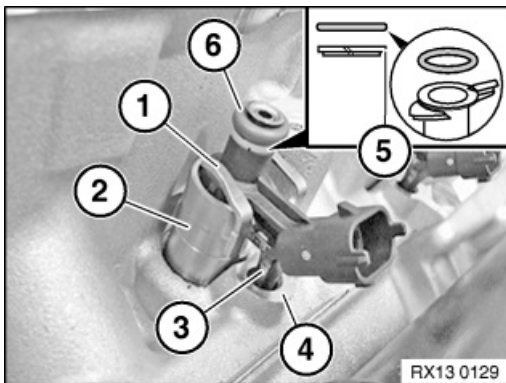
Remove injector.



The fuel injector installation procedure is described separately.

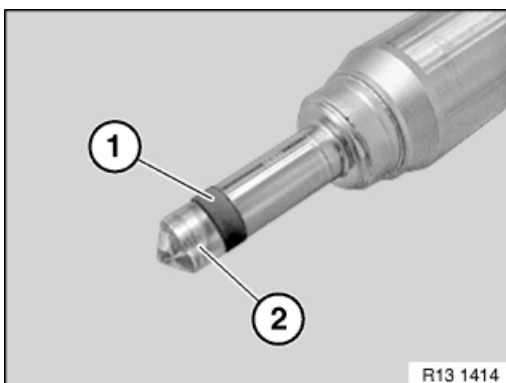


Before installing injector (1), replace decoupling element (2).



Installation: *Installation note:*

- Make sure guide pin (3) of fuel injector (2) is correctly positioned in designated hole (4) in cylinder head
- Replace sealing ring (6) and support ring (5), making sure support ring (5) is seated correctly
- Replace hold-down device (1)
- Replace Teflon sealing ring



Replacing Teflon sealing ring:

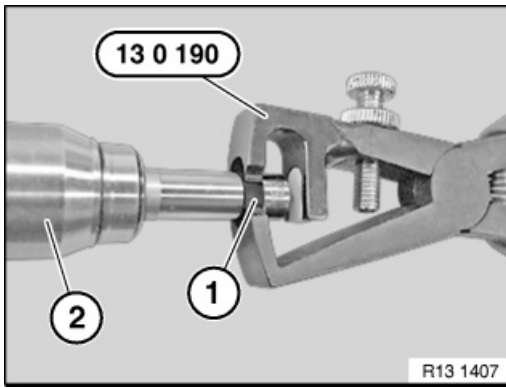
Note:

N53 Depiction of engine, procedure for N18 engine identical.

Before replacing Teflon sealing ring (1), make sure hands and work surface are clean and free of oil.

Avoid mechanical contact with injector tip (2).

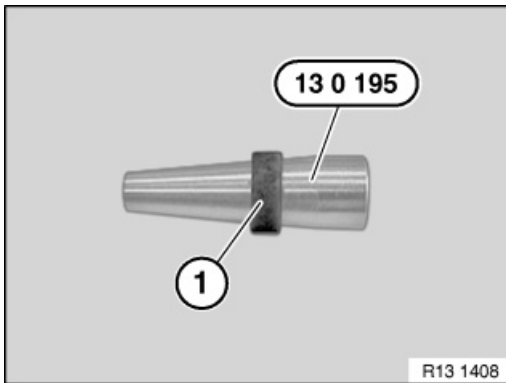




Remove Teflon sealing ring (1) from injector (2) with special tool 13 0 191 .

Use a fluff-free cloth only to remove combustion residues from cylindrical part of injector tip (do not use ultrasound or other auxiliary materials).

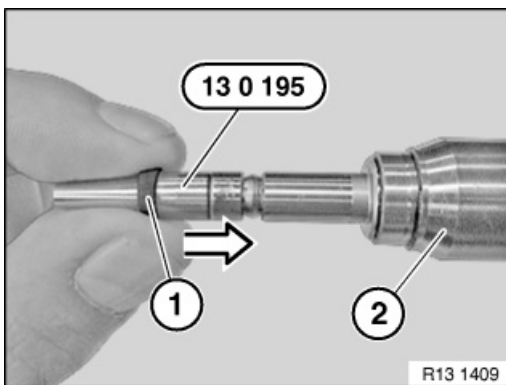
Do not clean injector tip (2).



Note:

N53 Depiction of engine, procedure for N18 engine identical.

Slide new Teflon sealing ring (1) 13 0 195 onto mounting taper .

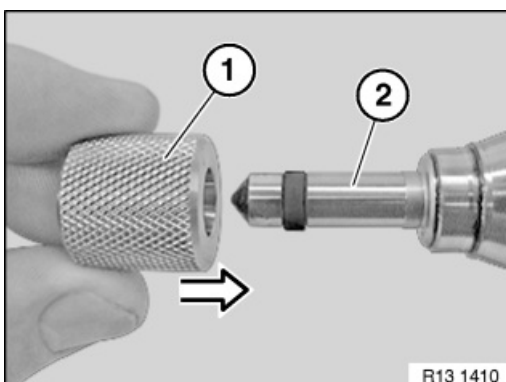


Note:

N53 Depiction of engine, procedure for N18 engine identical.

User fingers and mounting taper 13 0 195 to slide Teflon sealing ring (1) onto injector (2). *Note:*

- Do not use fingernails to slide on Teflon sealing ring.
- Do not use any lubricants.
- The sealing ring is expanded when slid on.



Note:

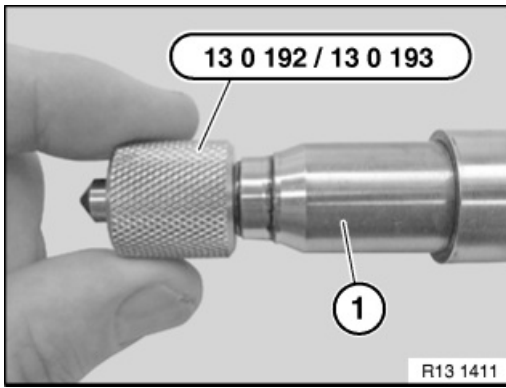
N53 Depiction of engine, procedure for N18 engine identical.

To bring the expanded Teflon sealing ring to its installation dimension, slide three assembly sleeves with decreasing diameters onto the injector.

Slide assembly sleeve (1) with large opening first onto injector (2).

Do not use any lubricating agents.



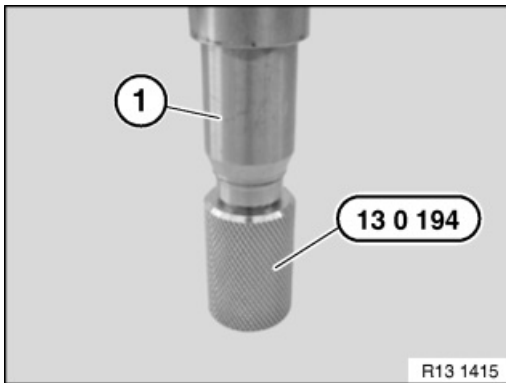


Note:

N53 Depiction of engine, procedure for N18 engine identical.

First slide assembly sleeve 13 0 192 (large diameter) onto injector (1).

Then slide assembly sleeve 13 0 193 (medium diameter) onto injector (1).



Note:

N53 Depiction of engine, procedure for N18 engine identical.

Finally, press injector (1) into assembly sleeve 13 0 194 (small diameter).



Assemble engine.

Check fuel system for tightness.

Check function of DME.



**Warning!**

Disconnect negative battery terminal (risk of fire due to short-circuiting on removal)

Carry out installation work on fuel system only with coolant temperature below 40 °C.

**Important!**

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!

**Important!**

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced dirt contamination can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.

**Necessary preliminary tasks:**

- Remove intake plenum.
- Remove pressure line.

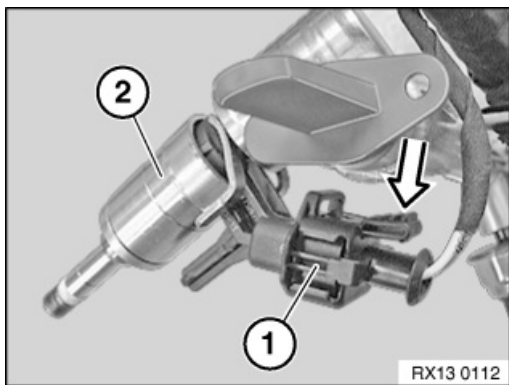
**Recycling:**

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

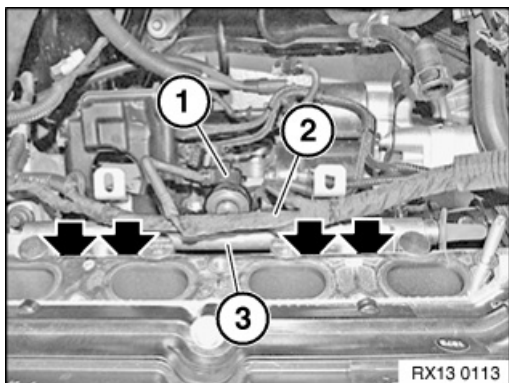




Note:

For purposes of clarity, illustration shows and description refers to the removed high-pressure rail.

Disconnect plug connections (1) of fuel injectors (2).



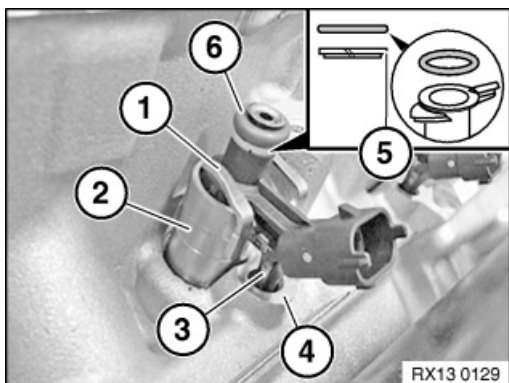
Disconnect plug connection (1) for high-pressure sensor.

Detach wiring harness (2) from high-pressure rail (3).

Release screws.

Tightening torque 13 53 3AZ.

Detach high-pressure rail (3) from cylinder head and remove.



Installation note:

- Refer to the procedure for installing fuel injector if a fuel injector (2) detached from the cylinder head (4) while removing the high-pressure rail.
- Replace hold-down device (1).
- Replace seal ring (6) and support ring (5), making sure support ring (5) is seated correctly
- Make sure guide pin (3) of fuel injector (2) is correctly positioned in designated hole in cylinder head (4).



Assemble engine.

Check fuel system for tightness.

Check function of DME.



**Special tools required:**

- 13 0 250
- 13 5 161
- 13 5 162
- 32 1 270

**Warning!**

Disconnect negative battery terminal (risk of fire due to short circuit on dismantling).

Carry out installation work on fuel system only with coolant temperature below 40 °C.

**Important!**

Wear protective face mask.

Fuel can emerge spontaneously at high speed when the fuel delivery line is released!

**Important!**

Adhere to conditions of absolute cleanliness when performing repair work on the fuel system.

Introduced contaminants can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system
- Remove all traces of dirt contamination before dismantling lines or separate components
- Use only fluff-free cloths
- Seal all fuel system openings with protective caps or plugs

**Important!**

When working on the oil, coolant or fuel circuit, you must protect the alternator against dirt contamination.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

**Necessary preliminary tasks:**

- remove sound generator



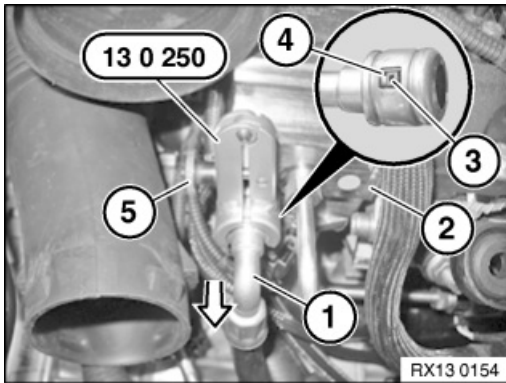


Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.



Procedure up to production date 03/2012 (Continental high pressure pump):

Place special tool 13 0 250 on fuel delivery line (1), positioning retaining lugs of tool in recesses in quick-release coupling (4).

Secure special tool 13 0 250 by means of knurled screw (5).

Warning!

Place a cloth over fuel delivery line (1) and high pressure pump (2).

To unlock, push fuel delivery line (1) towards high pressure pump (2), then detach in direction of arrow.

Remove special tool 13 0 250 and cloth.

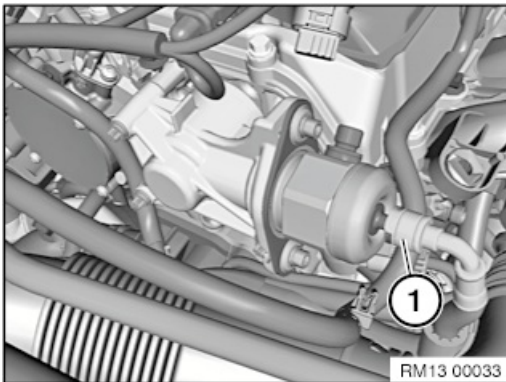
Close off fuel line connection of high pressure pump with a matching plug from special tool set 32 1 270 .

Close off fuel delivery line with special tool 13 5 161 .

Installation note:

Retaining lugs of lock must not be damaged. A fuel line with damaged retaining lugs must be replaced.

Fuel delivery line (1) must snap audibly into place.



Procedure from production date 03/2012 (Bosch high pressure pump):

Place special tool 13 0 250 on the fuel delivery line (1) and position the retaining lugs of the tool in the recesses of the quick-release coupling.

Fix special tool 13 0 250 using the knurled screw.

Warning!

Place a cloth over the fuel delivery line and high pressure pump.

To unlock the fuel delivery line (1), slide it towards the high pressure pump then pull it off.

Remove special tool 13 0 250 and cloth.

Plug the fuel line connection of the high pressure pump with the correct plug.

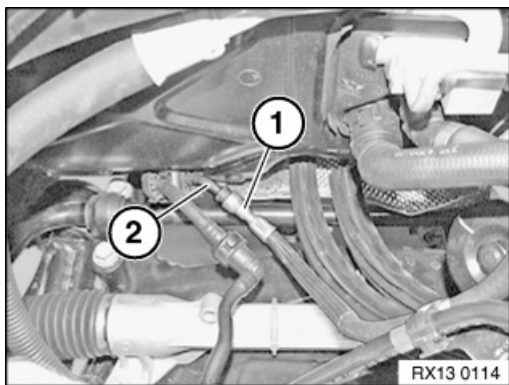
Close off fuel delivery line with special tool 13 5 161 .

Installation note:

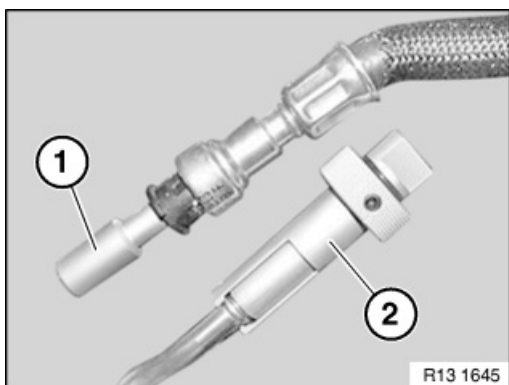
Retaining lugs of lock must not be damaged. A fuel line with damaged retaining lugs must be replaced.

Fuel delivery line must snap audibly into place.

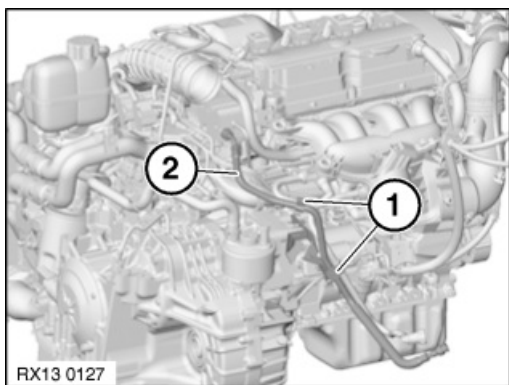




Unlock and disconnect fuel delivery line (1).
Close off fuel line (2) with special tool 13 5 162 .



Close off fuel delivery line with special tools (1) 13 5 161
and (2) 13 5 162 .



Unlock retaining tabs (1) and remove fuel delivery line (2). *Installation note:*
Ensure the fuel delivery line (2) is installed correctly (no chafing points).
Make sure retaining tabs (1) latch correctly.



Assemble engine.
Check fuel system for tightness.
Check function of DME.



13 51 017 Removing and installing/replacing high pressure pump (Bosch) (N18) from production date 03/2012



Special tools required:

- 13 0 250
- 13 5 161



Warning!

Observe warning on cylinder head cover.

Disconnect negative battery terminal (risk of fire due to short-circuiting on dismantling).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Important!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Important!

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced dirt contamination can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.



Important!

Ignition coils must not be contaminated by fuel.

The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!



Necessary preliminary tasks:

- Remove pressure line.
- Remove front right wheel arch cover.



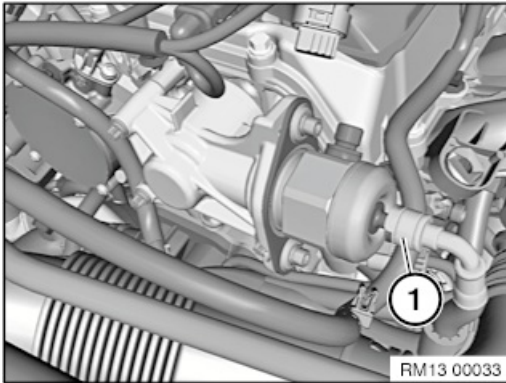


Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.



Place special tool 13 0 250 on the fuel delivery line (1) and position the retaining lugs of the tool in the recesses of the quick-release coupling.

Fix special tool 13 0 250 using the knurled screw.

Warning!

Place a cloth over the fuel delivery line and high pressure pump.

To unlock the fuel delivery line (1), slide it towards the high pressure pump then pull it off.

Remove special tool 13 0 250 and cloth.

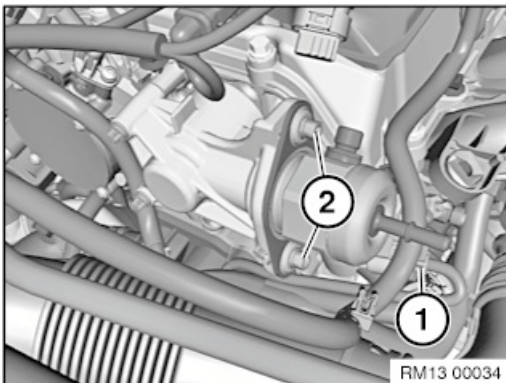
Plug the fuel line connection of the high pressure pump with the correct plug.

Close off fuel delivery line with special tool 13 5 161 .

Installation note:

Retaining lugs of lock must not be damaged. A fuel line with damaged retaining lugs must be replaced.

Fuel delivery line must snap audibly into place.



Unlock connector (1) and remove.

Unfasten screws (2).

Remove high pressure pump.

Make sure that the pump tappet does not fall out.

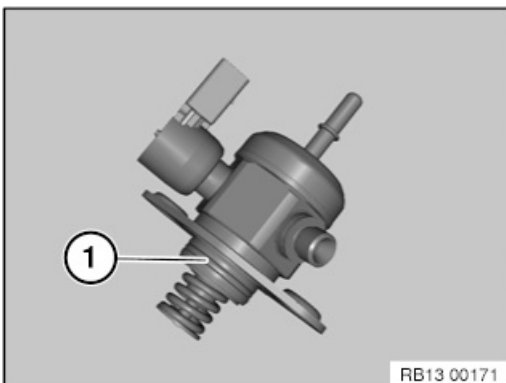
Engine oil can escape when pump is detached; have a cleaning cloth ready.

Installation note:

Before installing the high pressure pump, the cam of the high pressure pump drive must be turned to bottom dead centre. To do this, twist the engine if necessary in the direction of engine rotation to the central bolt of the crankshaft.

Provisionally fasten screws (1) and tighten alternately in 90° increments until final tightening.

Tightening torque 13 51 1AZ.



Installation note:

Replace gasket (1).

Clean contact surfaces at high pressure pump.





Assemble engine.

Reconnect plug connection on high pressure pump.

Check fuel system for tightness.

Check function of DME.



13 51 017 Removing and installing/replacing high pressure pump (Continental) (N18) up to production date 03/2012



Warning!

Disconnect negative battery terminal (risk of fire due to short circuit on removal).

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Important!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Important!

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced dirt contamination can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.



Necessary preliminary tasks:

- Release fuel delivery line at high pressure pump and seal.
- Remove pressure line.



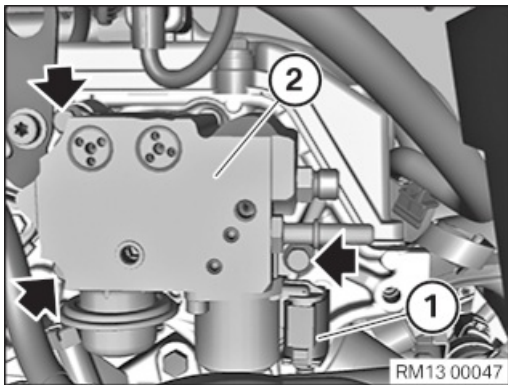
Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.





Removal:

Disconnect plug connection (1).

Remove screws and dispose of.

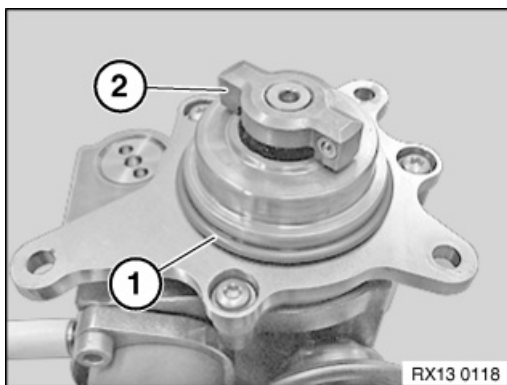
Detach high-pressure pump (2) and remove.

Note:

Engine oil can escape when pump is detached; have a cleaning cloth ready.

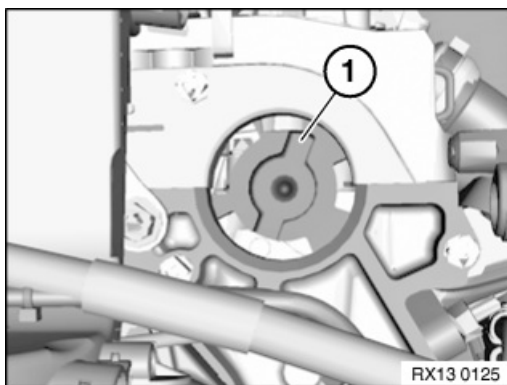


Installation of high pressure pump is described separately from removal.



Installation: *Installation note:*

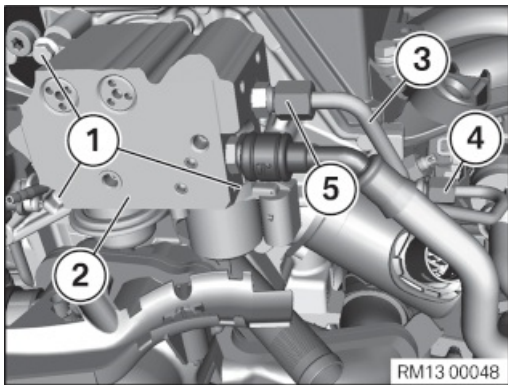
- Clean contact surface
- Replace sealing ring (1).
- Drive unit (2) of high-pressure pump must be turned into correct position prior to installation.



Installation note:

Align drive unit of high-pressure pump with respect to groove (1) on intake camshaft.





Installation note:

Replace screws (1).

Observe following installation sequence:

1. Hand-tighten bolts (1) of high pressure pump (2) (high pressure pump must still move)
2. Hand-tighten pressure line (3). First tighten nut (4) on high pressure rail and then tighten nut (5) on high pressure pump
3. Tighten high pressure pump
Tightening torque 13 51 1AZ.
4. Tighten pressure line (3).
Tightening torque 13 53 1AZ.



Assemble engine.

Reconnect plug connection on high pressure pump.

Check fuel system for tightness.

Check function of DME.



13 53 180 Removing and installing/replacing pressure line (Bosch high pressure pump) (N18) from production date 03/2012



Special tools required:

- 32 1 270



Warning!

Disconnect negative battery terminal (risk of fire due to short circuit on dismantling).

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Important!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Important!

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced dirt contamination can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.



Necessary preliminary tasks:

- Remove intake silencer housing.



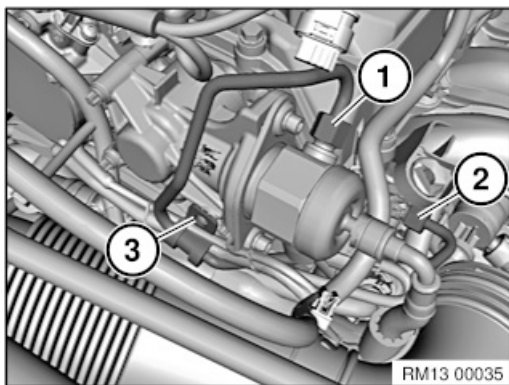
Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.





Removal:

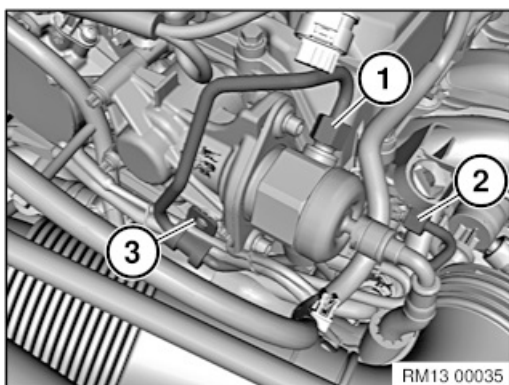
Slacken nut (1).

Slacken nut (2).

Release screw (3).

Seal high-pressure rail and high-pressure pump with fitting plugs (1) from special tool kit 32 1 270 .

Feed out and remove high pressure line.



Installation note:

The procedure described below must be followed precisely (to avoid leaks):

1. Preassemble pressure line, only hand-tighten nuts (1 and 2).
2. Firstly, tighten screw (3) on the retaining clip.
Tightening torque 13 53 5AZ.
3. Then tighten nut (2) on the high pressure rail.
Tightening torque 13 53 1AZ.
4. Then tighten nut (1) on the high pressure pump.
Tightening torque 13 53 1AZ.
5. Check fuel system for tightness.



Assemble engine.

Check function of DME.



13 53 180 Removing and installing/replacing pressure line (Continental high pressure pump) (N18) up to production date 03/2012



Special tools required:

- 32 1 270



Warning!

Disconnect negative battery terminal (risk of fire due to short circuit on dismantling).

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Important!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Important!

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced dirt contamination can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.



Necessary preliminary tasks:

- Remove intake silencer housing.



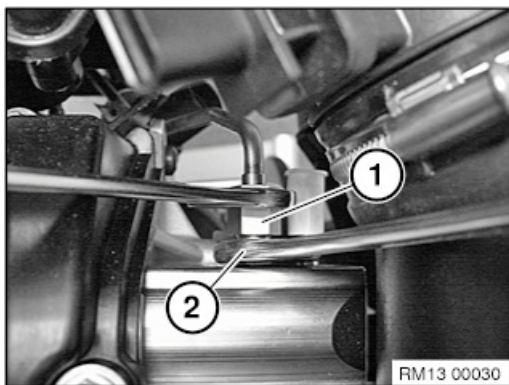
Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

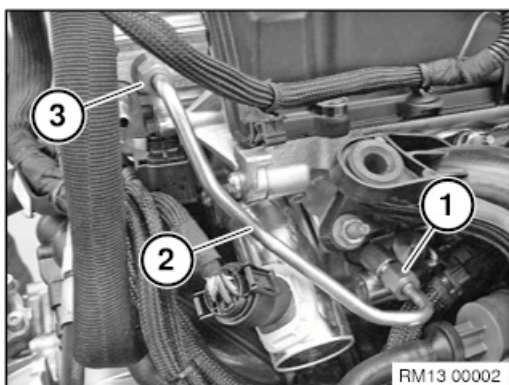
Observe country-specific waste disposal regulations.





Note:

Hold the connection piece with an open-ended spanner (2) while releasing pressure line (1).

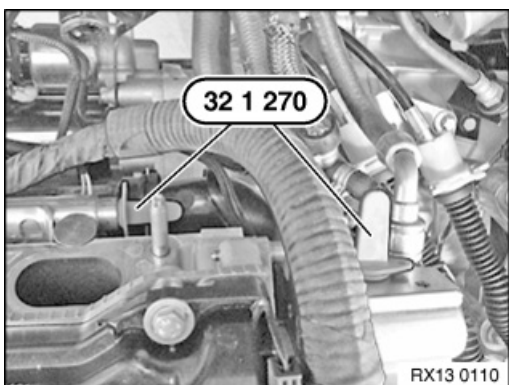


Removal:

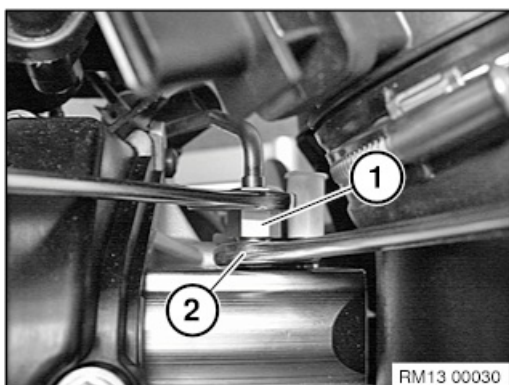
Slacken nut (1).

Unscrew nut (3).

Disconnect pressure line (2).



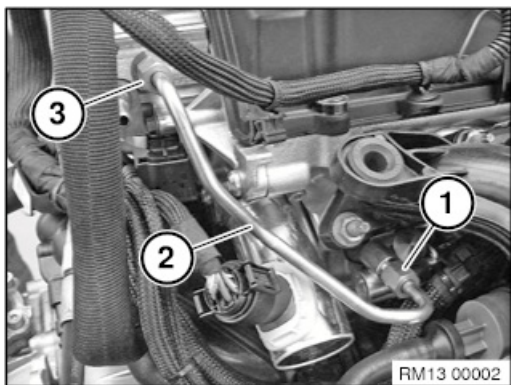
Seal high-pressure rail and high-pressure pump with fitting plugs (1) from special tool kit 32 1 270 .



Installation of pressure line is described separately from removal.

Hold the connection piece with an open-ended spanner (2) while tightening pressure line (1).





Installation note:

The procedure described below must be followed precisely (to avoid leaks):

1. Preassemble pressure line (2), only hand-tighten nuts (3 and 1).
2. When tightening screw connections, first tighten nut (1) and then nut (3).
3. Tighten nuts (1 and 3) according to tightening specifications 13 53 1AZ.
4. Check fuel system for tightness.



Assemble engine.

Check function of DME.



**Warning!**

- Risk of burning!
- Rotating components (risk of injury!)

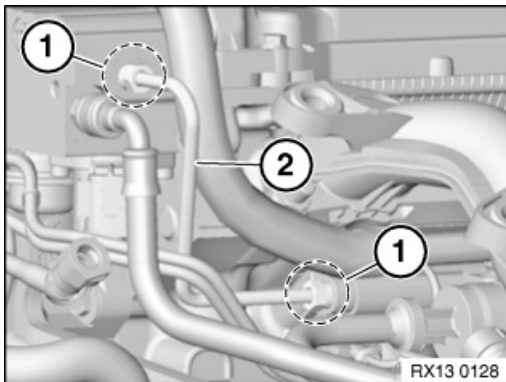
**Necessary preliminary work:**

- Remove intake silencer housing.
- Bring engine up to operating temperature.

**Important!**

Air bubbles form continuously in the event of a leak!

Static air bubbles indicate that there is no leak. They may be caused by the leak detector spray or when the leak detector agent liquifies.



Picture shows N14

Apply leak detector spray* in area of screw connection (1) of pressure line (2).

* Sourcing reference: BMW Parts Department

Repeat procedure several times and check for bubbles with telescopic mirror in the entire screw connection area (1).

**Note:**In case of tightness:

- Assemble engine
- Read out fault memory, clear if necessary.

In event of leakage:

- Replace **both components** at leak
- Repeat leak test after replacing components



13 53 310 Removing and installing or replacing one fuel injector in fuel injection system (N18)



Special tools required:

- 13 0 191
- 13 0 192
- 13 0 193
- 13 0 194
- 13 0 195
- 13 0 231
- 13 0 232



Warning!

Disconnect battery negative terminal (risk of fire due to short-circuiting on removal)

Carry out installation work on fuel system only with coolant temperature below 40 °C.

Only perform this repair work on an engine that has cooled down. Risk of burning!



Important!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Important!

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced dirt contamination can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.



Important!

Wear safety goggles.

Oil and dirt particles may get into your eyes!

After removing the injectors, clean the injector shafts with compressed air.





Necessary preliminary tasks:

- Remove high pressure rail.

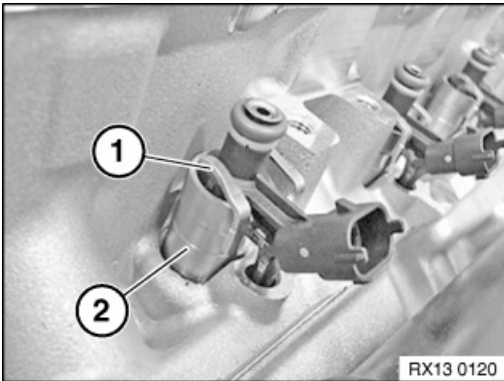


Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.



Removal:

Remove hold-down device (1) and discard.

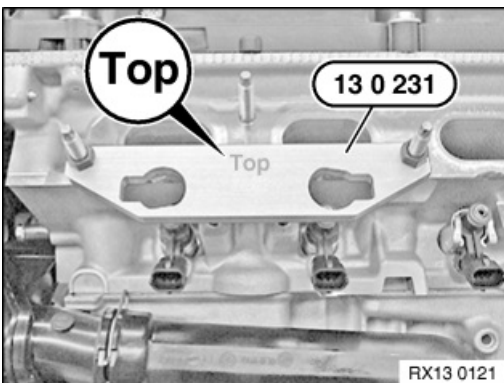
Pull up fuel injector (2) to remove.



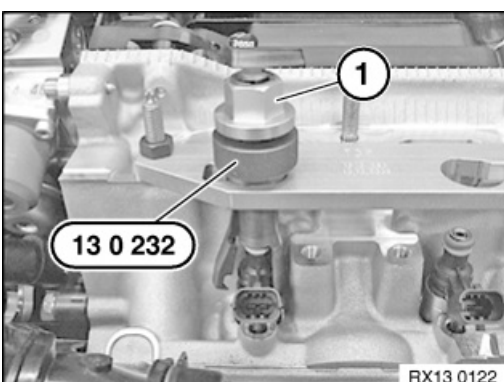
Procedure in event of stuck injectors: *Note:*

The following procedure applies to all injectors.

For purposes of clarity, illustration shows and description refers to the removed engine.



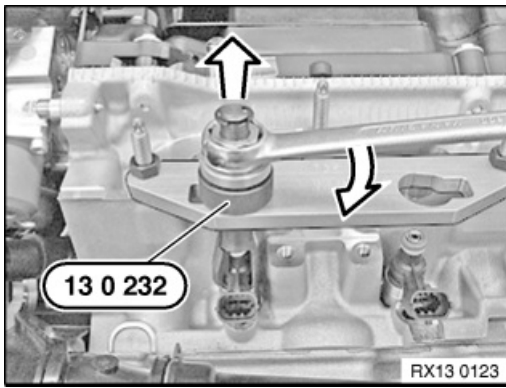
Mount special tool 13 0 231 with lettering "Top" facing upwards.



Mount special tool 13 0 232 .

To secure injector, turn nut (1) by hand until noticeable resistance is felt.





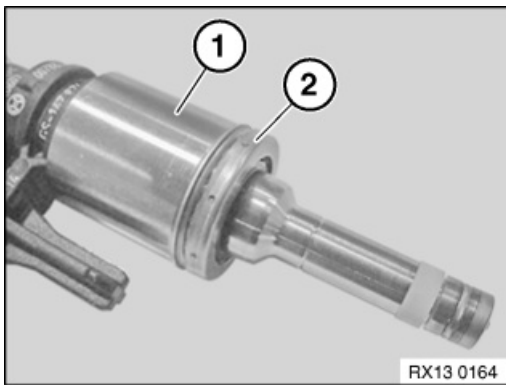
13 0 232 Turn nut on special tool several turns until injector has been released from hole.

Remove special tool.

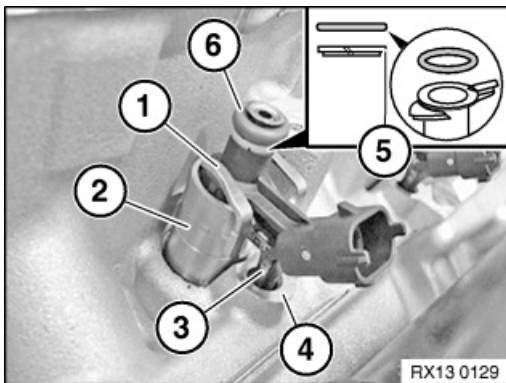
Remove injector.



The fuel injector installation procedure is described separately.

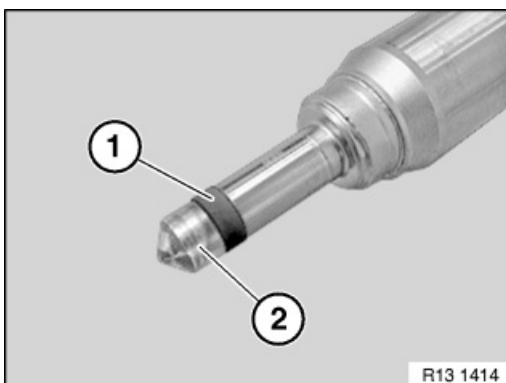


Before installing injector (1), replace decoupling element (2).



Installation: *Installation note:*

- Make sure guide pin (3) of fuel injector (2) is correctly positioned in designated hole (4) in cylinder head
- Replace sealing ring (6) and support ring (5), making sure support ring (5) is seated correctly
- Replace hold-down device (1)
- Replace Teflon sealing ring



Replacing Teflon sealing ring:

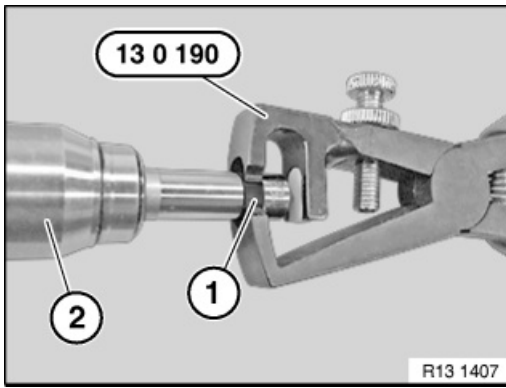
Note:

N53 Depiction of engine, procedure for N18 engine identical.

Before replacing Teflon sealing ring (1), make sure hands and work surface are clean and free of oil.

Avoid mechanical contact with injector tip (2).

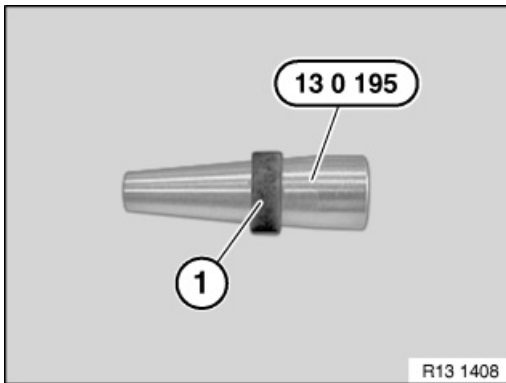




Remove Teflon sealing ring (1) from injector (2) with special tool 13 0 190 .

Use a fluff-free cloth only to remove combustion residues from cylindrical part of injector tip (do not use ultrasound or other auxiliary materials).

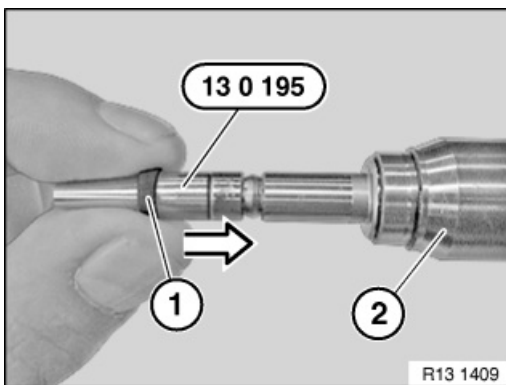
Do not clean injector tip (2).



Note:

N53 Depiction of engine, procedure for N18 engine identical.

Slide new Teflon sealing ring (1) 13 0 195 onto mounting taper .

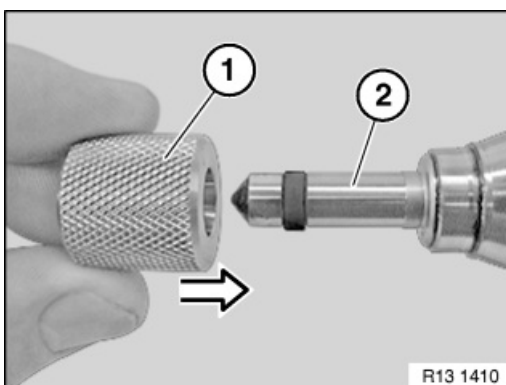


Note:

N53 Depiction of engine, procedure for N18 engine identical.

User fingers and mounting taper 13 0 195 to slide Teflon sealing ring (1) onto injector (2). *Note:*

- Do not use fingernails to slide on Teflon sealing ring.
- Do not use any lubricants.
- The sealing ring is expanded when slid on.



Note:

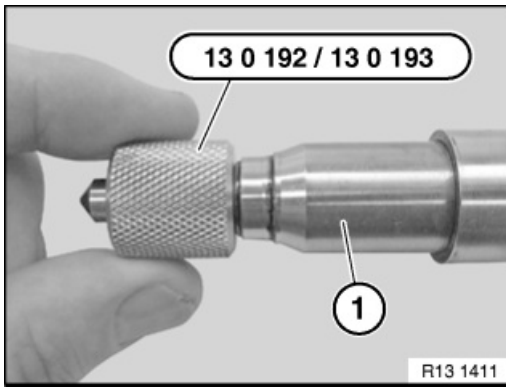
N53 Depiction of engine, procedure for N18 engine identical.

To bring the expanded Teflon sealing ring to its installation dimension, slide three assembly sleeves with decreasing diameters onto the injector.

Slide assembly sleeve (1) with large opening first onto injector (2).

Do not use any lubricating agents.

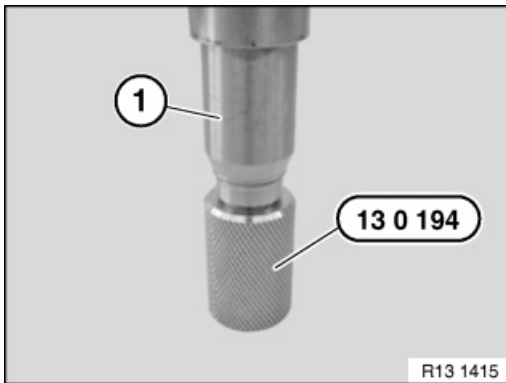




Note:

N53 Depiction of engine, procedure for N18 engine identical.

First slide assembly sleeve 13 0 192 (large diameter) onto injector (1).
Then slide assembly sleeve 13 0 193 (medium diameter) onto injector (1).



Note:

N53 Depiction of engine, procedure for N18 engine identical.

Finally, press injector (1) into assembly sleeve 13 0 194 (small diameter).



Assemble engine.

Check fuel system for tightness.

Check function of DME.



**Warning!**

Disconnect negative battery terminal (risk of fire due to short-circuiting on removal)

Carry out installation work on fuel system only with coolant temperature below 40 °C.

**Important!**

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!

**Important!**

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced dirt contamination can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.

**Necessary preliminary tasks:**

- Remove intake plenum.
- Remove pressure line.

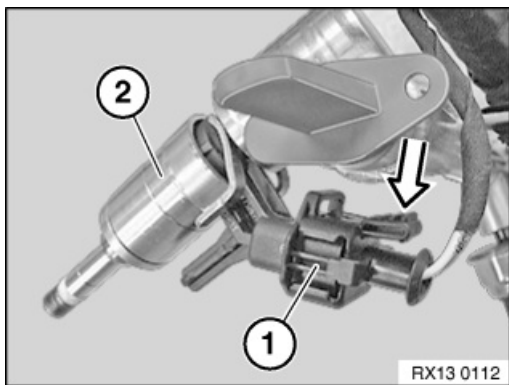
**Recycling:**

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

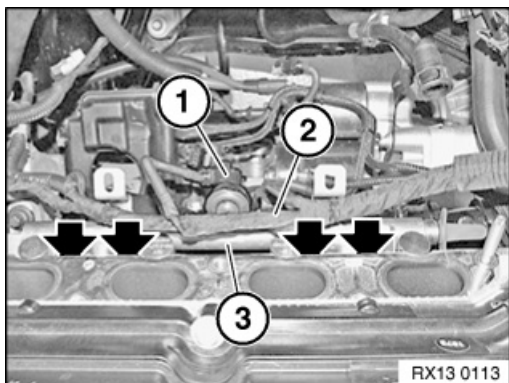




Note:

For purposes of clarity, illustration shows and description refers to the removed high-pressure rail.

Disconnect plug connections (1) of fuel injectors (2).



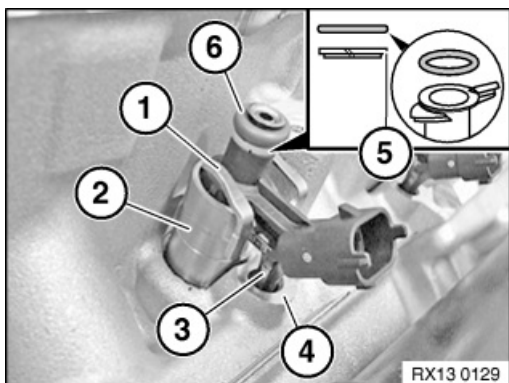
Disconnect plug connection (1) for high-pressure sensor.

Detach wiring harness (2) from high-pressure rail (3).

Release screws.

Tightening torque 13 53 3AZ.

Detach high-pressure rail (3) from cylinder head and remove.



Installation note:

- Refer to the procedure for installing fuel injector if a fuel injector (2) detached from the cylinder head (4) while removing the high-pressure rail.
- Replace hold-down device (1).
- Replace seal ring (6) and support ring (5), making sure support ring (5) is seated correctly
- Make sure guide pin (3) of fuel injector (2) is correctly positioned in designated hole in cylinder head (4).



Assemble engine.

Check fuel system for tightness.

Check function of DME.



**Special tools required:**

- 13 0 250
- 13 5 161
- 13 5 162
- 32 1 270

**Warning!**

Disconnect negative battery terminal (risk of fire due to short circuit on dismantling).

Carry out installation work on fuel system only with coolant temperature below 40 °C.

**Important!**

Wear protective face mask.

Fuel can emerge spontaneously at high speed when the fuel delivery line is released!

**Important!**

Adhere to conditions of absolute cleanliness when performing repair work on the fuel system.

Introduced contaminants can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system
- Remove all traces of dirt contamination before dismantling lines or separate components
- Use only fluff-free cloths
- Seal all fuel system openings with protective caps or plugs

**Important!**

When working on the oil, coolant or fuel circuit, you must protect the alternator against dirt contamination.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

**Necessary preliminary tasks:**

- remove sound generator



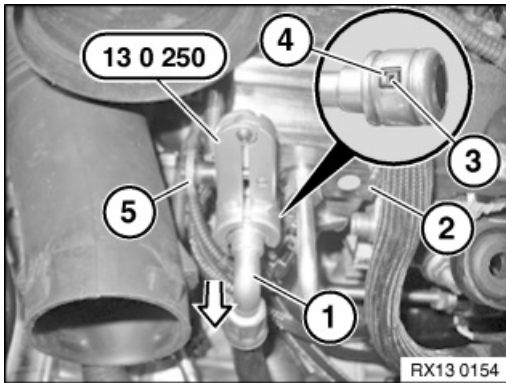


Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.



Procedure up to production date 03/2012 (Continental high pressure pump):

Place special tool 13 0 250 on fuel delivery line (1), positioning retaining lugs of tool in recesses in quick-release coupling (4).

Secure special tool 13 0 250 by means of knurled screw (5).

Warning!

Place a cloth over fuel delivery line (1) and high pressure pump (2).

To unlock, push fuel delivery line (1) towards high pressure pump (2), then detach in direction of arrow.

Remove special tool 13 0 250 and cloth.

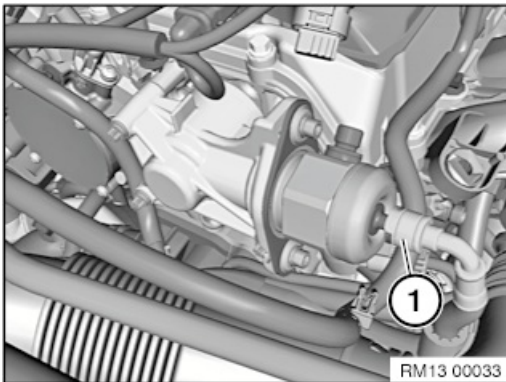
Close off fuel line connection of high pressure pump with a matching plug from special tool set 32 1 270 .

Close off fuel delivery line with special tool 13 5 161 .

Installation note:

Retaining lugs of lock must not be damaged. A fuel line with damaged retaining lugs must be replaced.

Fuel delivery line (1) must snap audibly into place.



Procedure from production date 03/2012 (Bosch high pressure pump):

Place special tool 13 0 250 on the fuel delivery line (1) and position the retaining lugs of the tool in the recesses of the quick-release coupling.

Fix special tool 13 0 250 using the knurled screw.

Warning!

Place a cloth over the fuel delivery line and high pressure pump.

To unlock the fuel delivery line (1), slide it towards the high pressure pump then pull it off.

Remove special tool 13 0 250 and cloth.

Plug the fuel line connection of the high pressure pump with the correct plug.

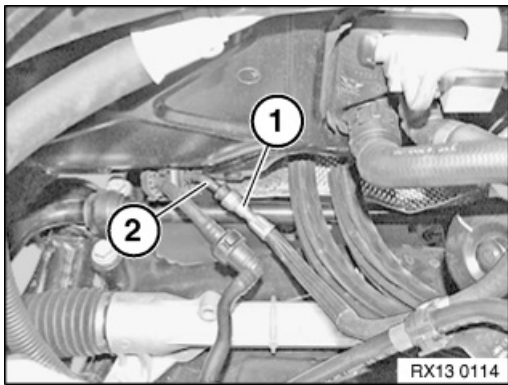
Close off fuel delivery line with special tool 13 5 161 .

Installation note:

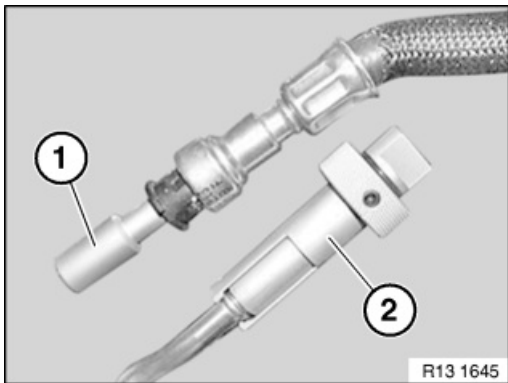
Retaining lugs of lock must not be damaged. A fuel line with damaged retaining lugs must be replaced.

Fuel delivery line must snap audibly into place.

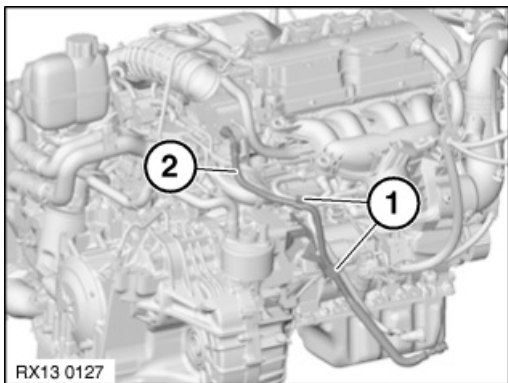




Unlock and disconnect fuel delivery line (1).
Close off fuel line (2) with special tool 13 5 162 .



Close off fuel delivery line with special tools (1) 13 5 161
and (2) 13 5 162 .



Unlock retaining tabs (1) and remove fuel delivery line (2). *Installation note:*
Ensure the fuel delivery line (2) is installed correctly (no chafing points).
Make sure retaining tabs (1) latch correctly.



Assemble engine.
Check fuel system for tightness.
Check function of DME.



13 53 180 Removing and installing/replacing pressure line (Bosch high pressure pump) (N18) from production date 03/2012



Special tools required:

- 32 1 270



Warning!

Disconnect negative battery terminal (risk of fire due to short circuit on dismantling).

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Important!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Important!

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced dirt contamination can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.



Necessary preliminary tasks:

- Remove intake silencer housing.



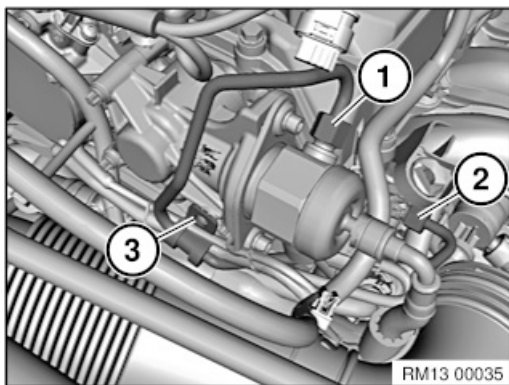
Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.





Removal:

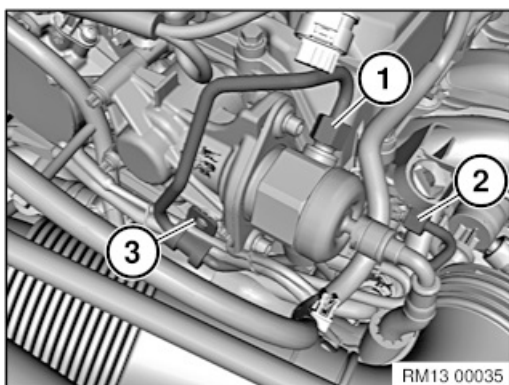
Slacken nut (1).

Slacken nut (2).

Release screw (3).

Seal high-pressure rail and high-pressure pump with fitting plugs (1) from special tool kit 32 1 270 .

Feed out and remove high pressure line.



Installation note:

The procedure described below must be followed precisely (to avoid leaks):

1. Preassemble pressure line, only hand-tighten nuts (1 and 2).
2. Firstly, tighten screw (3) on the retaining clip.
Tightening torque 13 53 5AZ.
3. Then tighten nut (2) on the high pressure rail.
Tightening torque 13 53 1AZ.
4. Then tighten nut (1) on the high pressure pump.
Tightening torque 13 53 1AZ.
5. Check fuel system for tightness.



Assemble engine.

Check function of DME.



13 53 180 Removing and installing/replacing pressure line (Continental high pressure pump) (N18) up to production date 03/2012



Special tools required:

- 32 1 270



Warning!

Disconnect negative battery terminal (risk of fire due to short circuit on dismantling).

Carry out installation work on fuel system only with coolant temperature below 40 °C.



Important!

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!



Important!

Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced dirt contamination can cause malfunctions in the system!

- Do not allow any dirt particles or foreign bodies to get into the system.
- Remove all traces of dirt before removing lines or separate components.
- Use only fluff-free cloths.
- Seal all fuel system openings with protective caps or plugs.



Necessary preliminary tasks:

- Remove intake silencer housing.



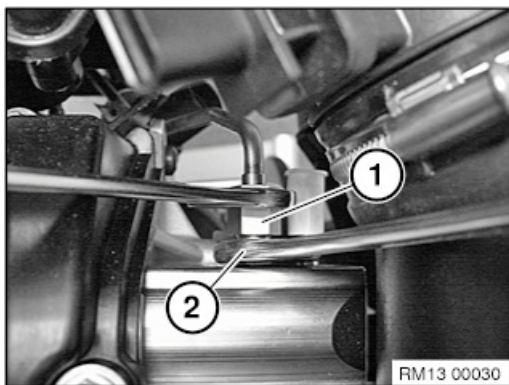
Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

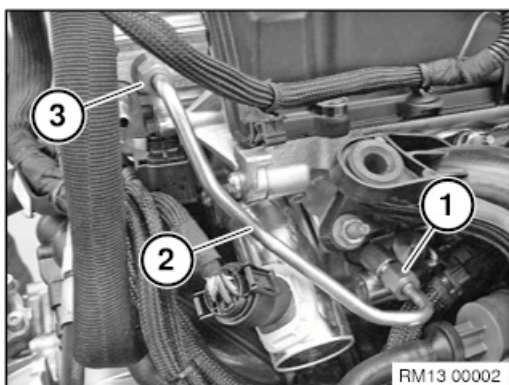
Observe country-specific waste disposal regulations.





Note:

Hold the connection piece with an open-ended spanner (2) while releasing pressure line (1).

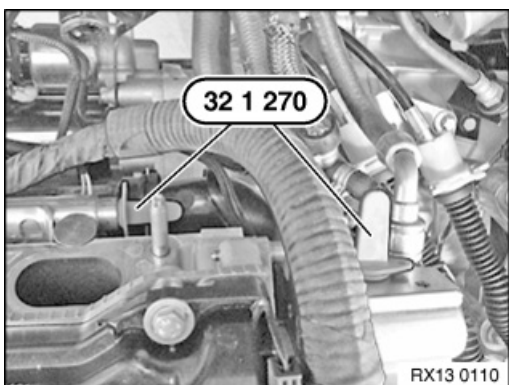


Removal:

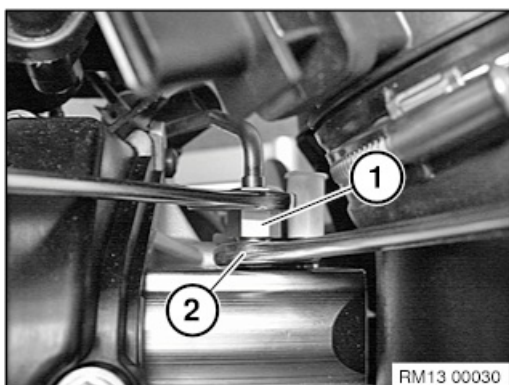
Slacken nut (1).

Unscrew nut (3).

Disconnect pressure line (2).



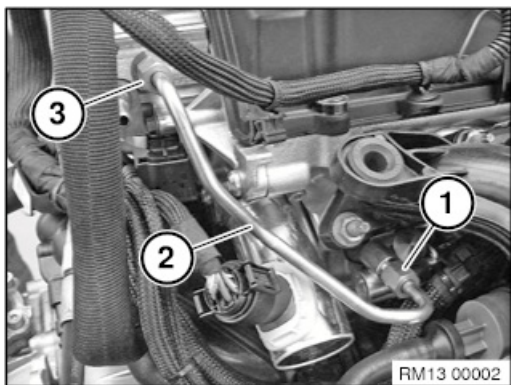
Seal high-pressure rail and high-pressure pump with fitting plugs (1) from special tool kit 32 1 270 .



Installation of pressure line is described separately from removal.

Hold the connection piece with an open-ended spanner (2) while tightening pressure line (1).





Installation note:

The procedure described below must be followed precisely (to avoid leaks):

1. Preassemble pressure line (2), only hand-tighten nuts (3 and 1).
2. When tightening screw connections, first tighten nut (1) and then nut (3).
3. Tighten nuts (1 and 3) according to tightening specifications 13 53 1AZ.
4. Check fuel system for tightness.



Assemble engine.

Check function of DME.



13 53 180 Replace pressure line



WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.



WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.



WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.



CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

PRELIMINARY WORK

1 – Disconnecting the battery earth lead

Prerequisite

Ignition is switched off.





RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.



TECHNICAL INFORMATION

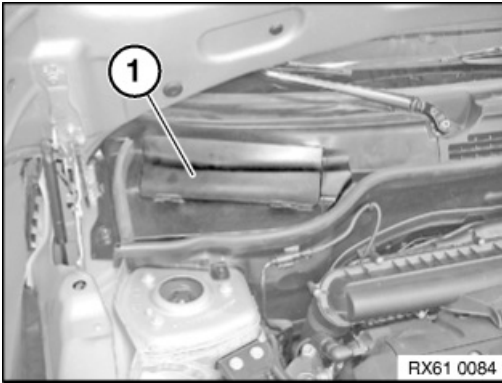
Observe the notes on handling the vehicle battery.

For additional information see:

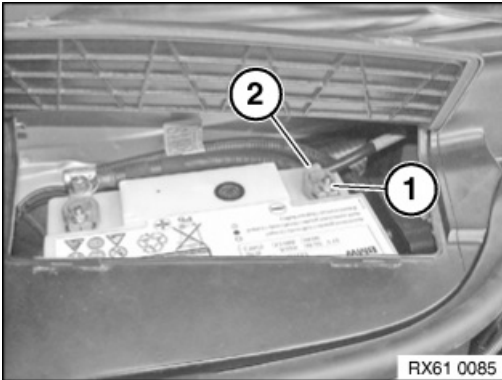
61 00 ... Safety information on handling the vehicle battery

61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery

61 12 ... Notes on the intelligent battery sensor (IBS)



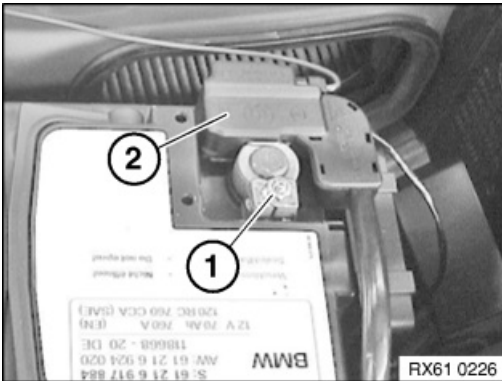
- Open the cover (1).



- **Equipment specification without the intelligent battery sensor (IBS):**

Slacken nut (1).

Remove the battery earth lead (2) and secure to one side.



- **Equipment specification with the intelligent battery sensor (IBS):**

Slacken nut (1).

Remove the battery earth lead (2) and secure to one side.

MAIN WORK

2 – Remove the high pressure line (production date as from 03/2012 Bosch high pressure pump N18)





WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.



WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.



WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.

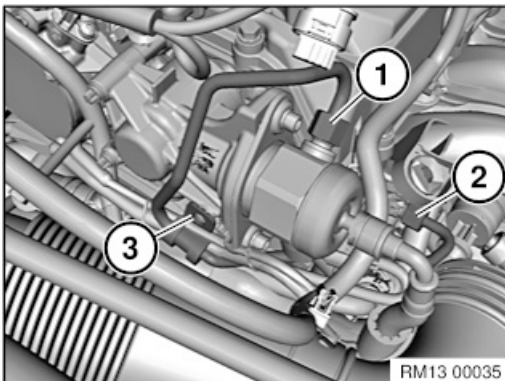


CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.



- Unfasten nut (1).
- Loosen nut (2).
- Loosen screw (3).
- Seal the rail and the high pressure pump using a matching plug (1) from the set of special tools [0 494 179 \(32 1 270\)](#) 32 1 270.
- Feed out and remove high pressure line.

3 – Install the high pressure line (production date as from 03/2012 Bosch high pressure pump N18)





WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.



WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.

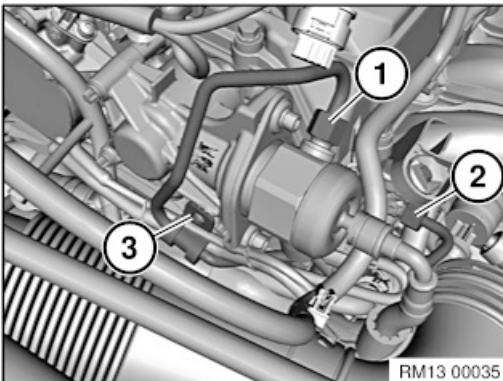


CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.



• Strictly adhere to the following sequence:

1. Insert the high pressure line.
2. Apply nuts (1) and (2) hand-tight.
3. Tighten screw (3) on the retaining clip.
4. Tighten the nut (2) on the high-pressure rail.
5. Tighten the nut (1) on the high pressure pump.
6. Check fuel system for tightness.

High-pressure pipe

Coupling nut		30 Nm
Screw for retaining clip		8 Nm

POSTPROCESSES

4 – Connecting the battery earth lead





RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.



TECHNICAL INFORMATION

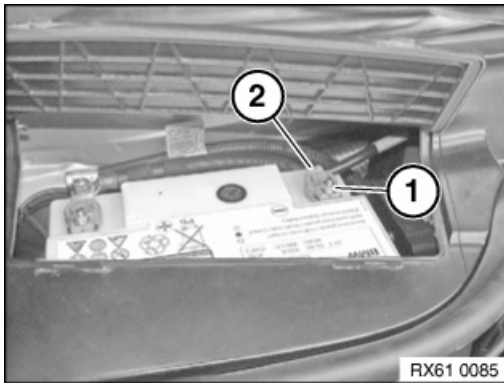
Observe the notes on handling the vehicle battery.

For additional information see:

61 00 ... Safety information on handling the vehicle battery

61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery

61 12 ... Notes on the intelligent battery sensor (IBS)



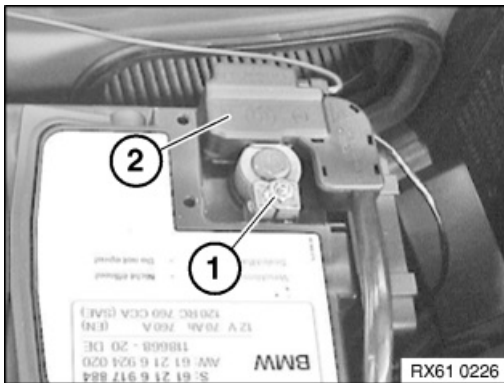
- **Equipment specification without the intelligent battery sensor (IBS):**

Place the battery earth lead (2) on the negative battery terminal.

Tighten nut (1).

Battery terminal

5 Nm



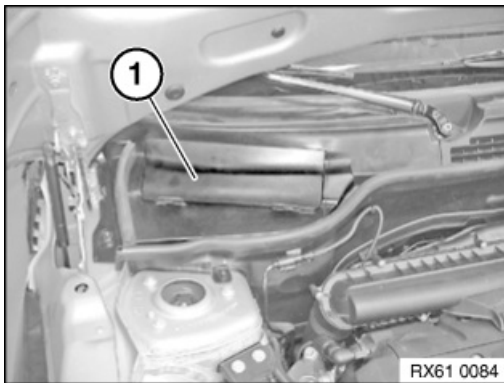
- **Equipment specification with the intelligent battery sensor (IBS):**

Place the battery earth lead (2) on the negative battery terminal.

Tighten nut (1).

Battery terminal

5 Nm



- Close the cover (1).

Additional Information

Overview of Tightening Torques



High-pressure pipe		Used in step	3
Coupling nut			30 Nm
Screw for retaining clip			8 Nm
Battery terminal		Used in step	4
			5 Nm

Overview of Special Tools

0 494 179 (32 1 270) Plug



Common		Used in step	2
Usage	(Plugs (set)) 27-piece, 3x per size - For sealing off hydraulic lines for brakes, steering etc.		
Included in the tool or work			
Storage location	individual		
Replaced by			
In connection with			
SI-Number	01 14 01 (766)		



13 53 180 Replace pressure line



WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.



WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.



WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.



CAUTION

On releasing high pressure line, fuel may emerge at high speed.

Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

PRELIMINARY WORK

1 – Disconnecting the battery earth lead

Prerequisite

Ignition is switched off.





RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.



TECHNICAL INFORMATION

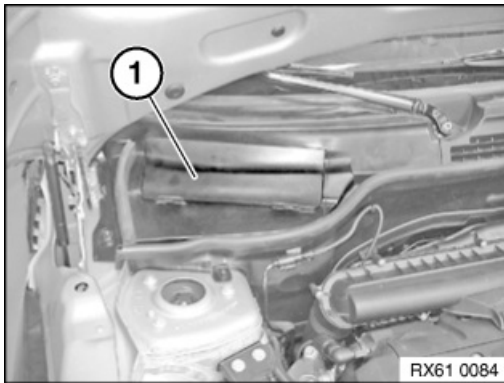
Observe the notes on handling the vehicle battery.

For additional information see:

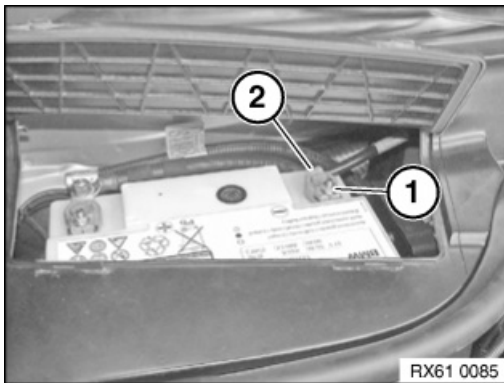
61 00 ... Safety information on handling the vehicle battery

61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery

61 12 ... Notes on the intelligent battery sensor (IBS)



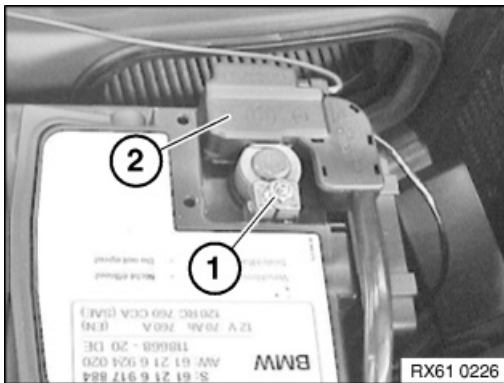
- Open the cover (1).



- **Equipment specification without the intelligent battery sensor (IBS):**

Slacken nut (1).

Remove the battery earth lead (2) and secure to one side.



- **Equipment specification with the intelligent battery sensor (IBS):**

Slacken nut (1).

Remove the battery earth lead (2) and secure to one side.

MAIN WORK

2 – Remove the high pressure line (production date up to 03/2012, continental high pressure pump N18)





WARNING

Working on 12 V vehicle electrical system.

Risk of short circuits! Risk of fire!

- Detach battery earth lead from battery.
- For additional batteries: Detach all battery earth leads from additional batteries.



WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.



WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.

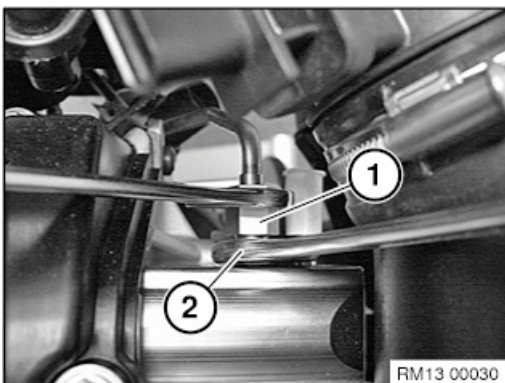


CAUTION

On releasing high pressure line, fuel may emerge at high speed.

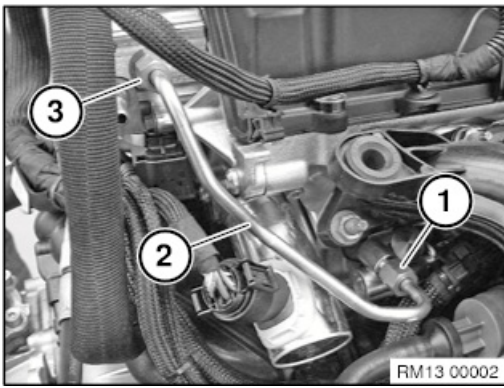
Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.

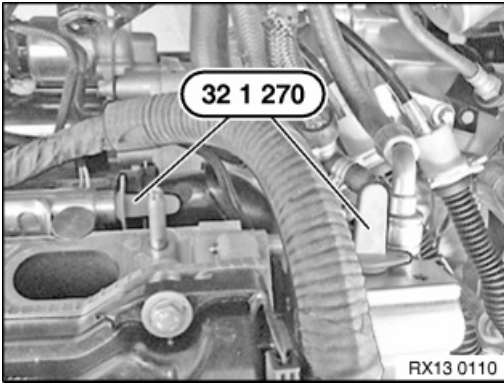


- When releasing the high pressure line (1) with an open-end spanner (2), hold the connector.





- Unfasten nut (1).
- Loosen nut (3).
- Remove high pressure line (2).



- Seal the rail and the high pressure pump using a matching plug (1) from the set of special tools [0 494 179 \(32 1 270\)](#).

3 – Install the high pressure line (production date up to 03/2012 continental high pressure pump N18)



WARNING

Working on fuel system.

Risk of fire! Danger of explosion!

- When working on the fuel system, make sure that the workbay is sufficiently ventilated, e.g. using extraction unit.
- Tightly seal off open lines and connections; collect any escaping fuel directly at the point of exit.
- No fire, sparks, open flames or smoking.



WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.



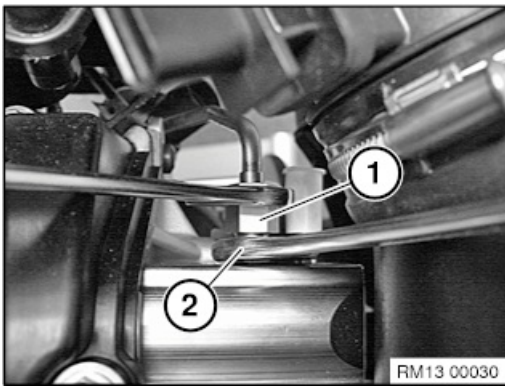
CAUTION

On releasing high pressure line, fuel may emerge at high speed.

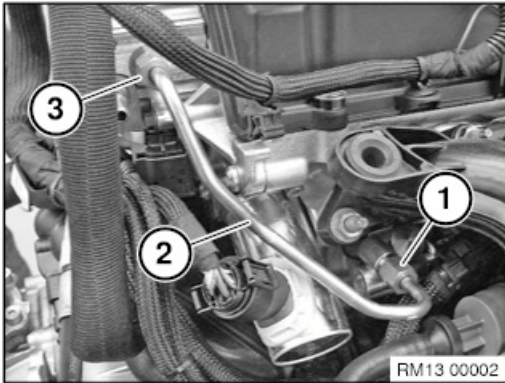
Danger of injury!

- Wear suitable personal protective equipment.
- Allow the cooling system to cool down to a temperature below 40°C before starting installation work.
- Note warnings on cylinder head cover.





- When tightening the high pressure line (1) with an open-end spanner (2), hold the connector.



- **Strictly adhere to the following sequence:**

1. Insert the high pressure line (2).
2. Apply nuts (3) and (1) hand-tight.
3. First tighten nut (1), then nut (3).

High-pressure pipe

	26 Nm
--	-------

- Check fuel system for tightness.



4 – Connecting the battery earth lead



RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.

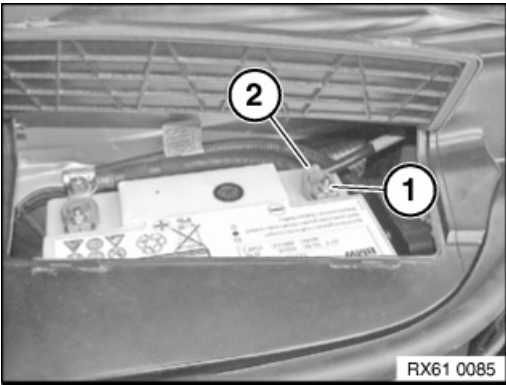


TECHNICAL INFORMATION

Observe the notes on handling the vehicle battery.

For additional information see:

- 61 00 ... Safety information on handling the vehicle battery
- 61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery
- 61 12 ... Notes on the intelligent battery sensor (IBS)



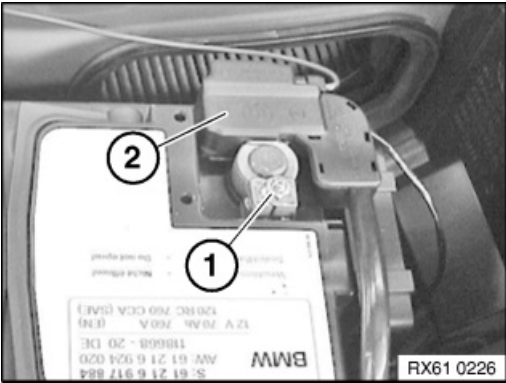
- **Equipment specification without the intelligent battery sensor (IBS):**

Place the battery earth lead (2) on the negative battery terminal.

Tighten nut (1).

Battery terminal

	5 Nm
--	------



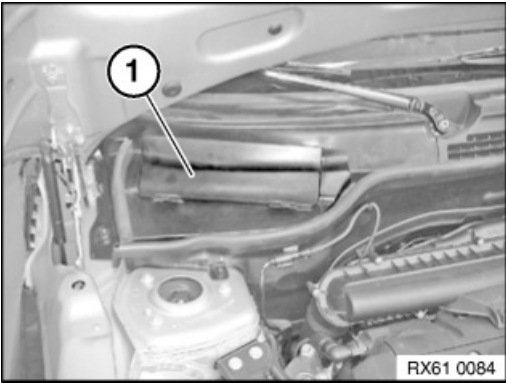
- **Equipment specification with the intelligent battery sensor (IBS):**

Place the battery earth lead (2) on the negative battery terminal.

Tighten nut (1).

Battery terminal

	5 Nm
--	------



- Close the cover (1).



Additional Information

Overview of Tightening Torques

High-pressure pipe	Used in step 3
	26 Nm
Battery terminal	Used in step 4
	5 Nm

Overview of Special Tools

0 494 179 (32 1 270) Plug



Common	Used in step 2
Usage	(Plugs (set)) 27-piece, 3x per size - For sealing off hydraulic lines for brakes, steering etc.
Included in the tool or work	
Storage location	individual
Replaced by	
In connection with	
SI-Number	01 14 01 (766)

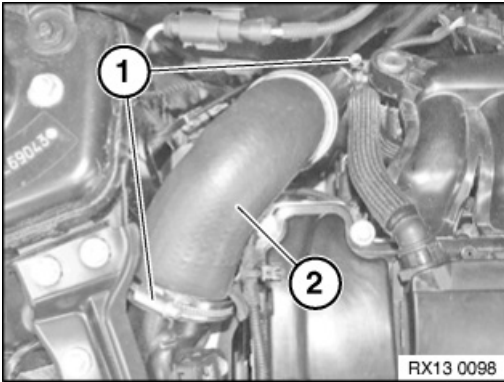


**Important!**

Charge air hoses with clamp fastenings must be installed dry and free from grease!

Sealing surfaces and connecting branches must be dry and free from grease.

If charge air hoses with clamp fastenings are not installed dry and free from grease, this may result in exhaust turbocharger failure!



Release hose clamps (1) and detach charge air hose (2). *Installation note:*

Install charge air hose (2) dry and free from grease.

Connecting branch on throttle valve must be dry and free from grease.

Important!

Position hose clamps (1) again correctly and ensure sufficient spacing to adjacent components.

The spacing between hose clamp and brake line must be 15 mm.



**Important!**

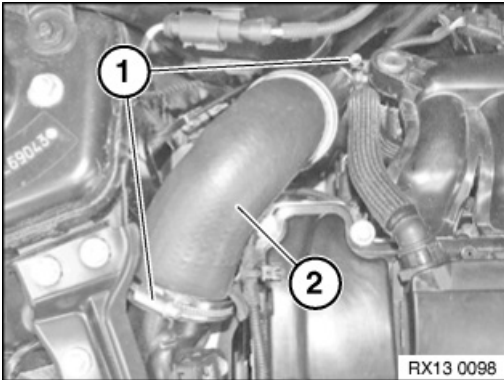
Charge air hoses with clamp fastenings must be installed dry and free from grease!

Sealing surfaces and connecting branches must be dry and free from grease.

If charge air hoses with clamp fastenings are not installed dry and free from grease, this may result in exhaust turbocharger failure!

*Necessary preliminary work:*

- Read out the fault memory of the DME control unit.
- Check stored fault messages.
- Switch off ignition.
- Removing the sound generator.



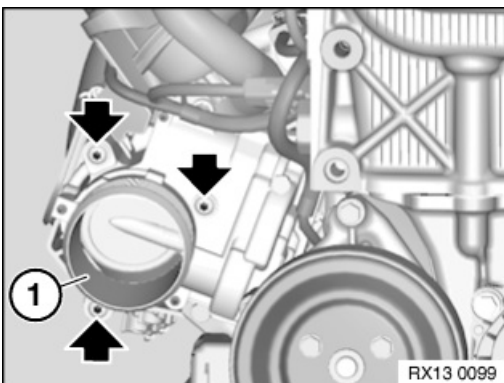
Release hose clamps (1) and detach charge air hose (2). *Installation note:*

Install charge air hose (2) dry and free from grease.

Connecting branch on throttle valve must be dry and free from grease.

Position hose clamps (1) again correctly and ensure sufficient spacing to adjacent components.

The spacing between hose clamp and brake line must be 15 mm.



Release screws and carefully feed out throttle body (1) towards top until connector is accessible.

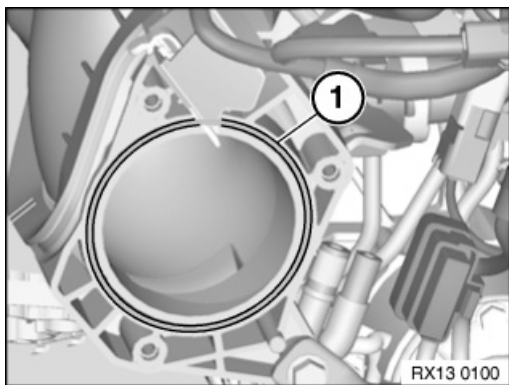
Tightening torque 13 54 1AZ.

Unlock connector and disconnect.

Detach cable strap.

Remove throttle valve assembly.





Installation note:
Replace sealing ring (1).



Note:
Check stored fault messages.
Clear diagnostic fault entries from fault memory.





Important!

Gaiter with clamp fastening must be fitted dry and free from grease!

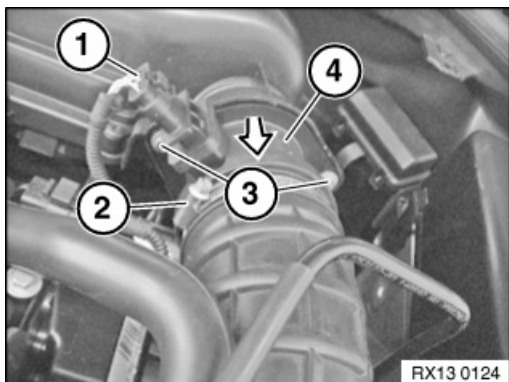
Sealing surfaces and connecting branches must be dry and free from grease.

If the gaiter with clamp fastening is not installed dry and free from grease, this may result in exhaust turbocharger failure!



Necessary preliminary work:

- Read out fault memory of DME control unit.
- Switch off ignition.



Disconnect plug connection (1).

Release clamp (2).

Release screws (3).

Tightening torque 13 62 1AZ .

Pull the gaiter off the hot film air mass meter.

Installation note:

Fit gaiter dry and without grease.

The connecting branch on the hot film air mass meter must be dry and free from grease.

Remove hot film air mass meter (4) in direction of arrow.



Note:

Check stored fault messages.

Delete fault memory.





Important!

Gaiter with clamp fastening must be fitted dry and free from grease!

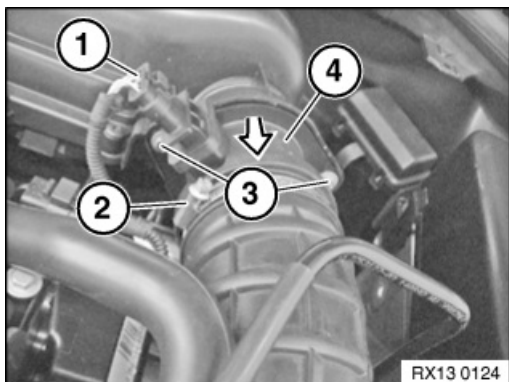
Sealing surfaces and connecting branches must be dry and free from grease.

If the gaiter with clamp fastening is not installed dry and free from grease, this may result in exhaust turbocharger failure!



Necessary preliminary work:

- Read out fault memory of DME control unit.
- Switch off ignition.



Disconnect plug connection (1).

Release clamp (2).

Release screws (3).

Tightening torque 13 62 1AZ .

Pull the gaiter off the hot film air mass meter.

Installation note:

Fit gaiter dry and without grease.

The connecting branch on the hot film air mass meter must be dry and free from grease.

Remove hot film air mass meter (4) in direction of arrow.



Note:

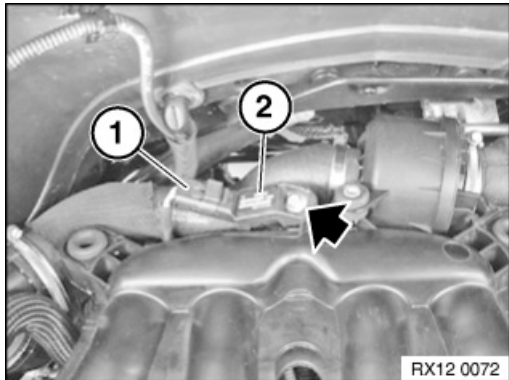
Check stored fault messages.

Delete fault memory.



**Necessary preliminary work:**

Remove intake silencer housing.



Unlock connector (1) and remove.

Release screw.

Detach suction pressure sensor (2) from intake plenum.

Installation note:

- Check sealing ring, replace if necessary.
- Tightening torque 13 62 5AZ .



Installation note:

Check stored fault messages.

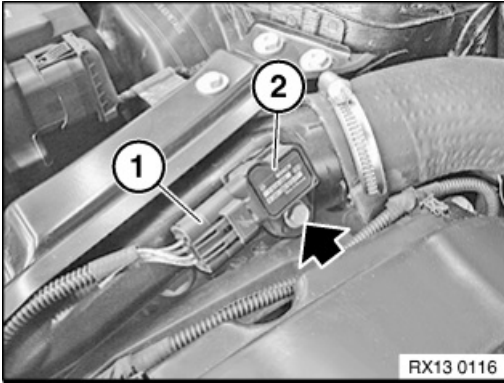
Delete fault memory.





Important!

Read and comply with notes on protection against electrostatic discharge (ESD protection).



Unlock connector (1) and remove.

Release screw and detach sensor (2) from charge air duct.

Installation note:

- Check sealing ring for damage, replace if necessary.
- When installing, coat sealing ring with suitable lubricant.
- Tightening torque 13 62 6AZ.



Check stored fault messages.

Clear diagnostic fault entries from fault memory.



13 64 579 Clean all injectors with ultrasonic device

Prerequisite

- Injectors removed (See repair instructions 13 53 310)



WARNING

Contact with hazardous fluids.

Hazardous to health!

- Note and follow safety information on containers.
- Conduct all work in appropriate personal protective equipment only.



RISK OF DAMAGE

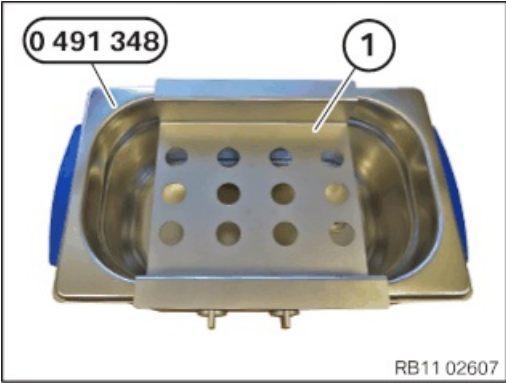
Contaminant or foreign body.

Contamination can result in malfunctions, operating failure or leaks.

- Adhere to the utmost cleanliness.
- Protect components from contamination e.g. by covering.
- Close off line connections with seal plugs.

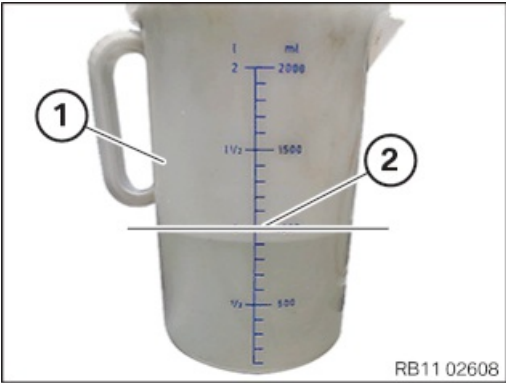


1 – Prepare ultrasonic device



- Prepare cleaning device with cleaning basket (1).

2 – Fill ultrasonic device with cleaning agent



- Measure the cleaning agent in a measuring cup (1).

Cleaning of injectors with the ultrasonic cleaning unit

Cleaning temperature	60 °C
Cleaning time	30 min
Quantity of SPX special cleaner per cleaning cycle	1000 ml
Expendable materials: SPX special cleaner	

3 – Clean injectors in ultrasonic device



- Fill cleaning agent into the ultrasonic device.
- Position and push injectors (1) into the cleaning basket (see graphic).
- Adjust cleaning device .

Cleaning of injectors with the ultrasonic cleaning unit

Cleaning temperature	60 °C
Cleaning time	30 min
Quantity of SPX special cleaner per cleaning cycle	1000 ml
Expendable materials: SPX special cleaner	

- Follow manufacturer's instructions.

Additional Information

Overview of Special Tools

Overview Technical Data



Cleaning temperature	60 °C
Cleaning time	30 min
Quantity of SPX special cleaner per cleaning cycle	1000 ml
Expendable materials: SPX special cleaner	



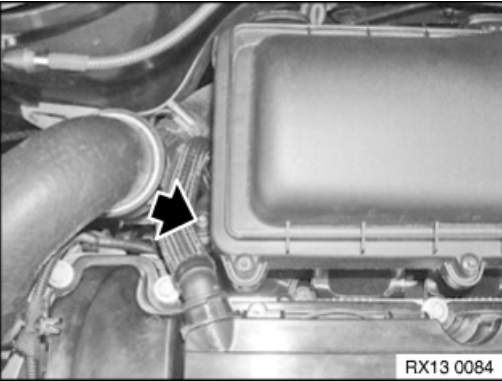
13 71 000 Remove and install intake silencer housing

i

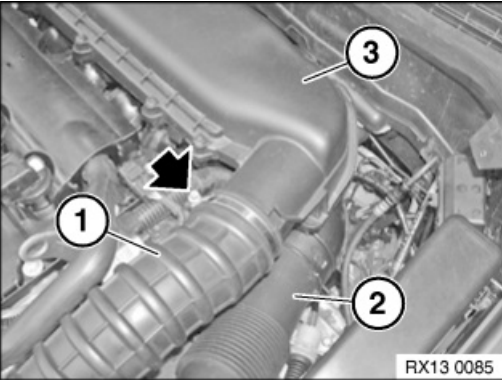
TECHNICAL INFORMATION

The gaiter and charge air hoses that are secured with clamps must be installed dry and free from grease. The exhaust turbocharger can otherwise fail.

1 – Removing intake silencer housing

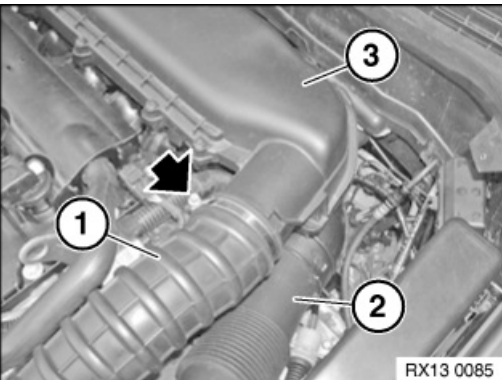


- Release screw (arrow).

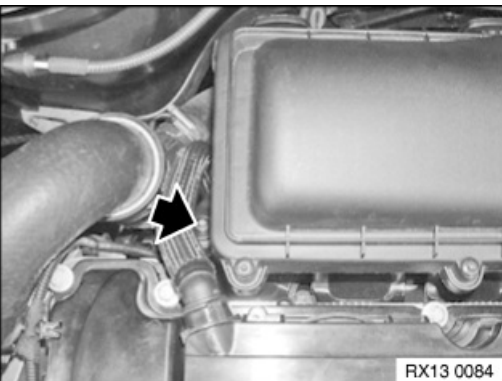


- Disconnect the hose clamp (arrow) and pull the gaiter (1) off the intake filter housing (3).
- Slightly press in the intake pipe (2) at the latch mechanisms and pull it off from the intake silencer housing (3).
- Remove the intake silencer housing (3) together with the intake pipe.
- With vehicles that have a hot film air mass meter: Disconnect plug connection.

2 – Installing intake silencer housing



- Install the intake silencer housing (3) together with the intake pipe.
- Connect the intake pipe (2) to the intake pipe on the intake silencer housing (3).
- Connect the gaiter (1) to the intake silencer housing (3).
- Secure the hose clamp (arrow).



- Tighten screw (arrow).

Intake silencer housing N14, N18

			6 Nm
--	--	--	------



Additional Information

Overview of Tightening Torques

Intake silencer housing N14, N18			Used in step 2
			6 Nm





Important!

Air duct with clamp fastening must be fitted dry and free from grease!

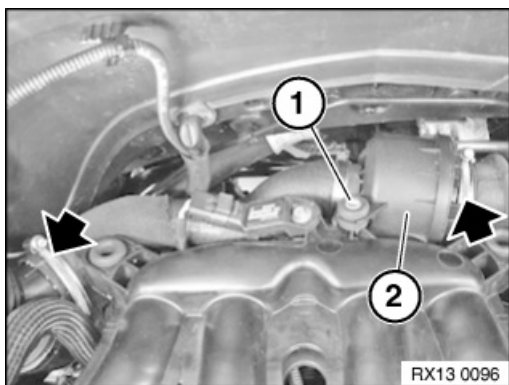
Sealing surfaces and connecting branches must be dry and free from grease.

If air ducts with clamp fastenings are not installed dry and free from grease, this may result in exhaust turbocharger failure!



Necessary preliminary work:

- Remove intake silencer housing.



Unfasten hose clamps.

Tightening torque 13 71 5AZ.

Release screw (1).

Detach sound generator (2) from air duct and remove.

Installation note:

Fit air duct dry and without grease.

Connecting branch on the sound generator must be dry and free from grease.





Important!

Gaiter and charge air hoses with clamp fastenings must be installed dry and free from grease!

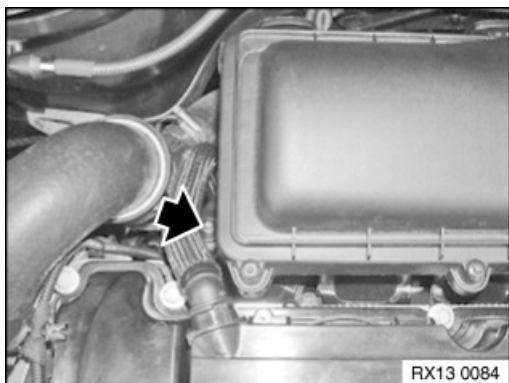
Sealing surfaces and connecting branches must be dry and free from grease.

If gaiter and charge air hoses with clamp fastenings are not installed dry and free from grease, this may result in exhaust turbocharger failure!



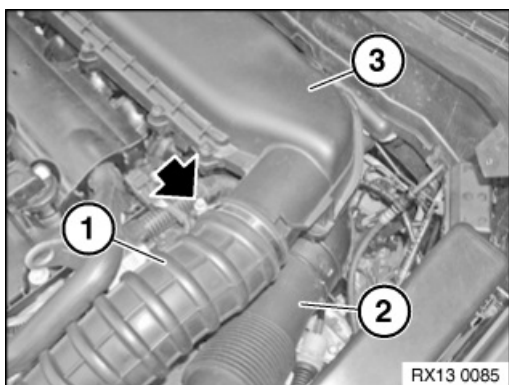
Necessary preliminary tasks:

- Switch off ignition.



Loosen screw.

Tightening torque 13 71 4AZ.



Loosen the clamp and detach the gaiter (1) from the intake silencer housing (3).

Installation note:

Install gaiter (1) dry and free from grease.

Connecting branch on intake silencer housing must be dry and free from grease.

Lightly press the intake pipe (2) at the latch mechanisms and pull off from intake pipe on intake silencer housing (3).

Remove the intake silencer housing (3) together with the intake pipe.



With vehicles that have a hot film air mass meter:

- Disconnect plug connection.

Replacement:

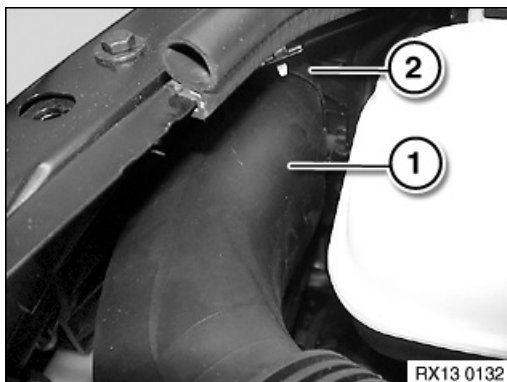
Remount hot film air mass meter.





Necessary preliminary work:

- Switch off ignition.
- Remove intake silencer housing.

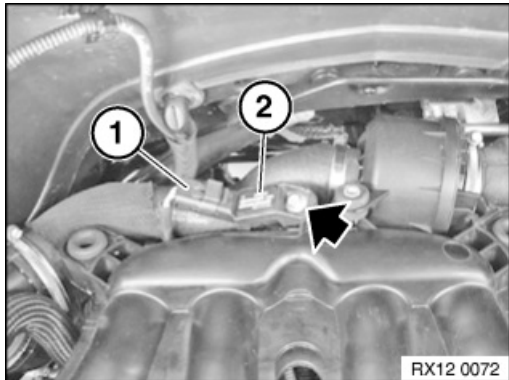


Unclip the intake pipe (1) from the front panel (2), thread out and remove.



**Necessary preliminary work:**

Remove intake silencer housing.



Unlock connector (1) and remove.

Release screw.

Detach suction pressure sensor (2) from intake plenum.

Installation note:

- Check sealing ring, replace if necessary.
- Tightening torque 13 62 5AZ .



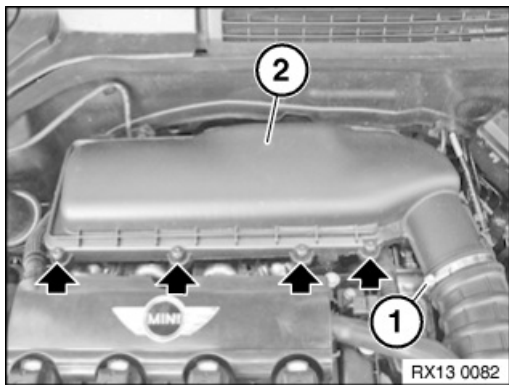
Installation note:

Check stored fault messages.

Delete fault memory.



13 72 001 Replacing air filter element (N14, N18)



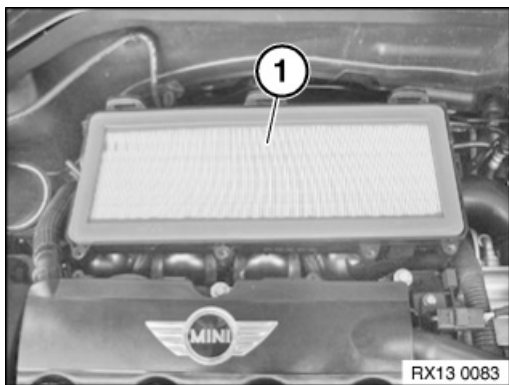
Release screws.

Tightening torque 13 71 3AZ .

With vehicles that have a hot film air mass meter:

- Disconnect connector connection.

Release clamp (1) and pull the lid (2) off the air hose and remove.



Remove air filter element (1) from intake silencer housing. *Installation note:*

Clean intake silencer housing.





Important!

Air duct with clamp fastening must be fitted dry and free from grease!

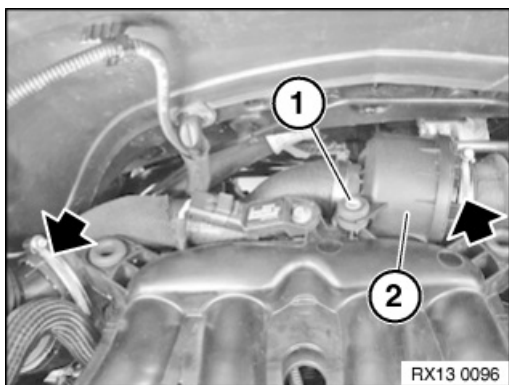
Sealing surfaces and connecting branches must be dry and free from grease.

If air ducts with clamp fastenings are not installed dry and free from grease, this may result in exhaust turbocharger failure!



Necessary preliminary work:

- Remove intake silencer housing.



Unfasten hose clamps.

Tightening torque 13 71 5AZ.

Release screw (1).

Detach sound generator (2) from air duct and remove.

Installation note:

Fit air duct dry and without grease.

Connecting branch on the sound generator must be dry and free from grease.



13 74 001 Removing and installing/replacing sound generator

PRELIMINARY WORK

1 – Disconnecting the battery earth lead

Prerequisite

Ignition is switched off.



RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.



TECHNICAL INFORMATION

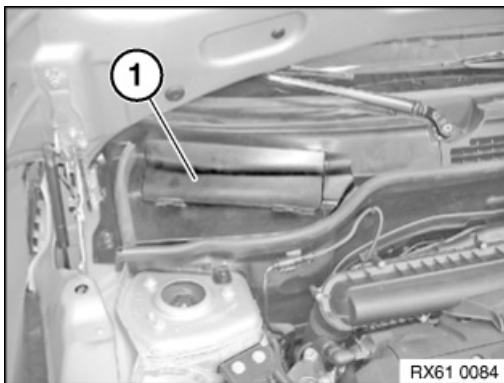
Observe the notes on handling the vehicle battery.

For additional information see:

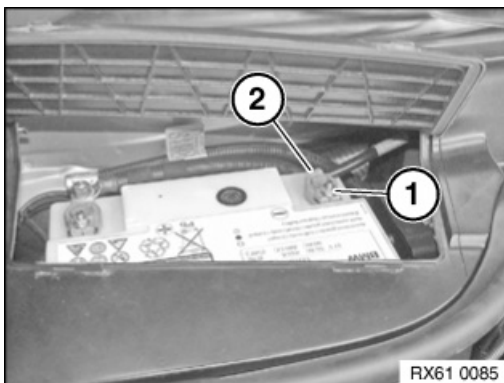
61 00 ... Safety information on handling the vehicle battery

61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery

61 12 ... Notes on the intelligent battery sensor (IBS)



- Open the cover (1).

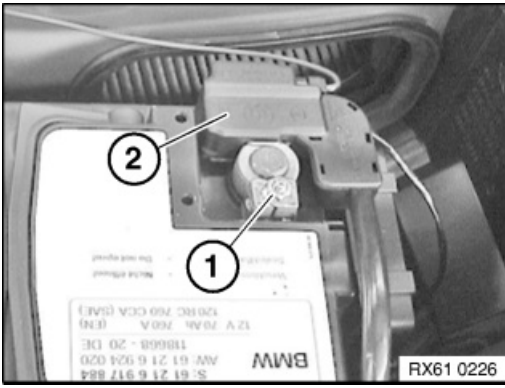


- **Equipment specification without the intelligent battery sensor (IBS):**

Slacken nut (1).

Remove the battery earth lead (2) and secure to one side.

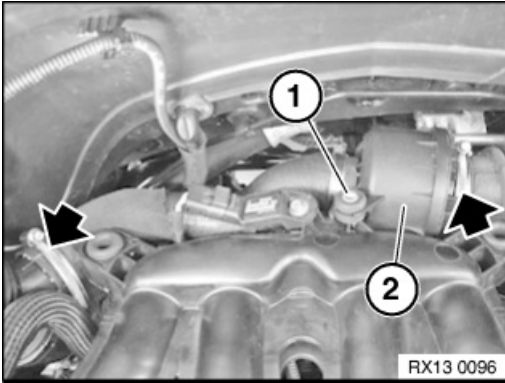




- **Equipment specification with the intelligent battery sensor (IBS):**
Slacken nut (1).
Remove the battery earth lead (2) and secure to one side.

MAIN WORK

2 – remove sound generator



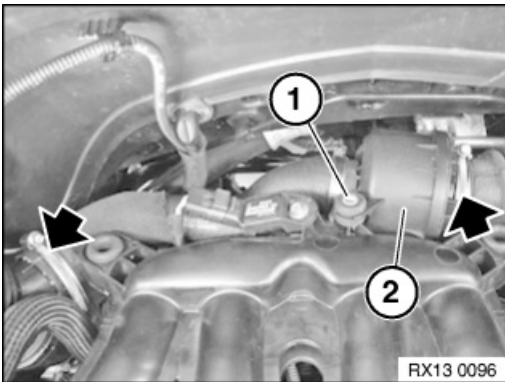
- Unfasten hose clamps (Pfeile).
- Loosen screw (1).
- Pull off and remove the sound generator (2) from the air duct.

3 – Installing the sound generator



TECHNICAL INFORMATION

The sealing surfaces must be free from oils, grease and cleaning agents.



- Install the sound generator (2) on the air duct.
- Tighten down screw (1).
- Tighten the hose clamps (Pfeile).

Hose clamp to sound generator

3 Nm



4 – Connecting the battery earth lead



RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.

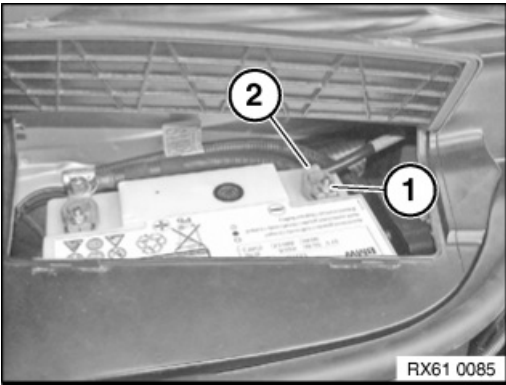


TECHNICAL INFORMATION

Observe the notes on handling the vehicle battery.

For additional information see:

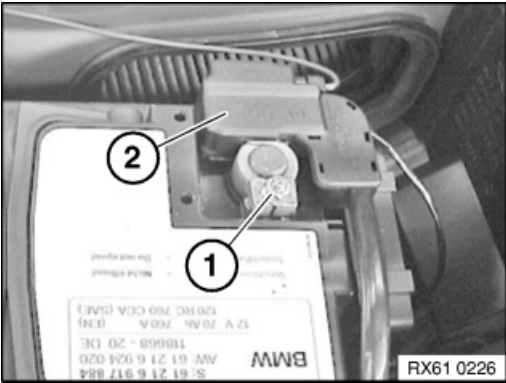
- 61 00 ... Safety information on handling the vehicle battery
- 61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery
- 61 12 ... Notes on the intelligent battery sensor (IBS)



- **Equipment specification without the intelligent battery sensor (IBS):**
Place the battery earth lead (2) on the negative battery terminal.
Tighten nut (1).

Battery terminal

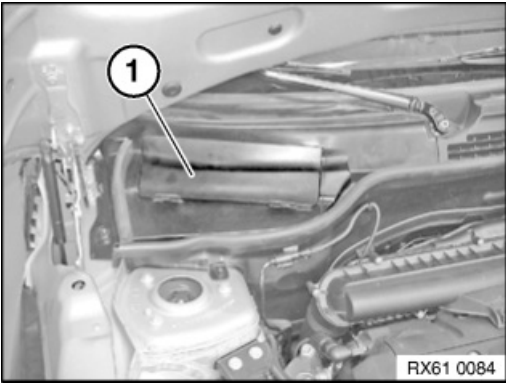
	5 Nm
--	------



- **Equipment specification with the intelligent battery sensor (IBS):**
Place the battery earth lead (2) on the negative battery terminal.
Tighten nut (1).

Battery terminal

	5 Nm
--	------



- Close the cover (1).



Overview of Tightening Torques

Hose clamp to sound generator	Used in step 3
	3 Nm
Battery terminal	Used in step 4
	5 Nm

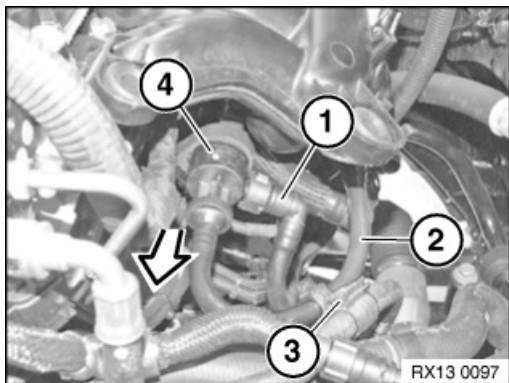


*Necessary preliminary work:*

- Read out fault memory of DME control unit.
- Switch off ignition.
- Removing the sound generator.

Installation location:

Tank vent valve is fitted at bottom on intake plenum.



Unlock and disconnect line (1).

Unclip line (2) from holder (3). Unlock line (2) and detach from intake plenum.

Detach tank vent valve (4) from holder until the connector is accessible. Unlock and pull off the connector and remove the tank vent valve (4).

*Note:*

Read out fault memory of DME control unit.

Delete fault memory.





Important!

Gaiter with clamp fastening must be fitted dry and free from grease!

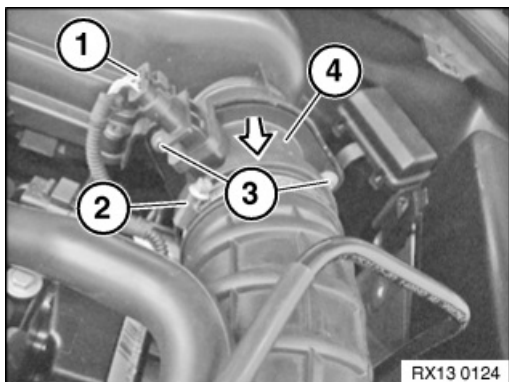
Sealing surfaces and connecting branches must be dry and free from grease.

If the gaiter with clamp fastening is not installed dry and free from grease, this may result in exhaust turbocharger failure!



Necessary preliminary work:

- Read out fault memory of DME control unit.
- Switch off ignition.



Disconnect plug connection (1).

Release clamp (2).

Release screws (3).

Tightening torque 13 62 1AZ .

Pull the gaiter off the hot film air mass meter.

Installation note:

Fit gaiter dry and without grease.

The connecting branch on the hot film air mass meter must be dry and free from grease.

Remove hot film air mass meter (4) in direction of arrow.



Note:

Check stored fault messages.

Delete fault memory.



16 00 100 Checking fuel tank and tank venting system for leaks (not US version with DMTL)



Special tools required:

- 13 3 010
- 16 1 070
- 16 1 171
- 16 1 174



Note:

The following procedure is only applicable to vehicles without the tank leak diagnosis module.

Check tank venting system if a leak is suspected.

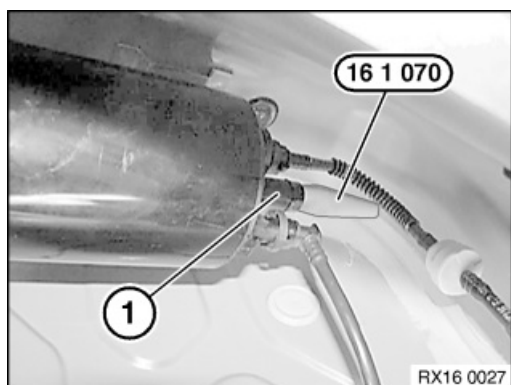
Necessary preliminary tasks:

- Remove rear right wheel arch trim.



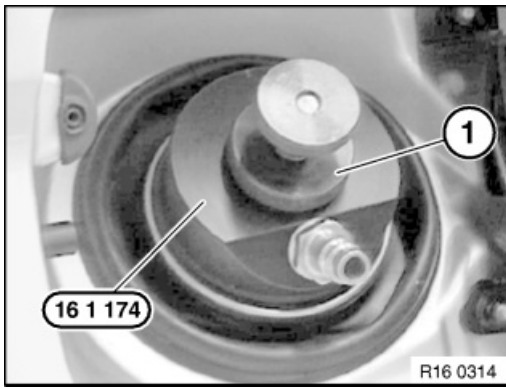
Comply with the following conditions in order to obtain plausible test results:

- Content of fuel tank:
 1. Maximum 90 %
 2. Minimum 13 % (reserve telltale must not light up).
- Park the car in the workshop at least 2 hours before the test so that the fuel temperature is approximately that of the workshop temperature (ideal fuel temperature approx. 10 ... 20 °C).
- Never refuel the vehicle directly prior to the leak test due to the strong emission of gas by the fresh fuel.



Using special tool 16 1 070 , seal opening (1) on carbon canister.





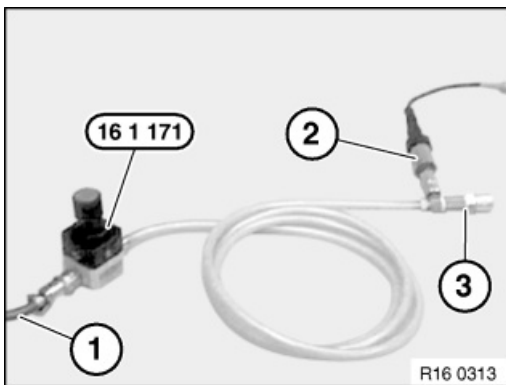
Remove fuel filler cap and connect special tool 16 1 174 to fuel filler neck.

Clamp special tool 16 1 174 on fuel filler neck with adjusting wheel (1).



Important!

Set pressure regulator on special tool 16 1 171 fully in "–" direction.



Connect special tool 16 1 171 using compressed air line (1) to garage compressed air system (8 ... 10 bar).

Connect pressure sensor (2) from Diagnosis and Information System with a measuring range of 0...3.5 bar.

Important!

Do not yet connect fast-release coupling (3) of special tool 16 1 171 .



Select "Measurement" function on Diagnosis and Information System (DIS).

Using pressure regulator on special tool 16 1 171 , increase pressure by 0.050 bar.

Connect special tool 16 1 174 to fast-release coupling of special tool 16 1 171 .

Using pressure regulator on special tool 16 1 171 , reset gauge pressure in fuel tank to 0.050 bar.



Important!

Do not under any circumstances increase pressure by more than 0.05 bar as this would result in damage to the fuel tank and venting system.



Using special tool 13 3 010 , disconnect delivery line from special tool 16 1 171 to fuel filler neck.

Allow a rest period of approx. 20 secs.

Read off and note down starting pressure value.

Wait approx. 60 secs.

Read off final pressure value and compare with starting pressure value.

Measurement evaluation:

Pressure drop between 0.008 and 0.010 bar.	Measure again.
Pressure drop in 60 secs. greater than 0.010 bar.	System leaking beyond permitted levels. Carry out leak test.



16 00 100 Checking fuel tank and tank venting system for leaks (petrol/gasoline cars with leak diagnosis pump / US version)



Special tools required:

- 13 3 010
- 16 1 161
- 16 1 171
- 16 1 174



Necessary preliminary tasks:

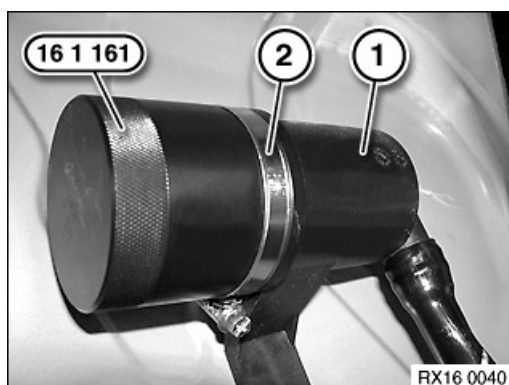
- Remove rear right wheel arch trim



The following procedure is only applicable to cars with the leak diagnosis pump (US version).

Comply with the following conditions in order to obtain plausible test results:

- Content of fuel tank:
 1. Maximum 90 %
 2. Minimum 13 % (reserve telltale must not light up).
- Park the car in the workshop at least 2 hours before the test so that the fuel temperature is approximately that of the workshop temperature (ideal fuel temperature approx. 10 ... 20 °C).



Clean housing of dust filter (1).

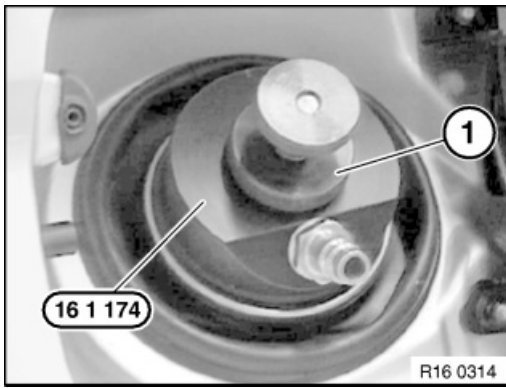
Slide special tool 16 1 161 over vent openings of dust filter.

Important!

Slide special tool 16 1 161 on dust filter (1) until openings are sealed.

Tighten down hose clip (2).





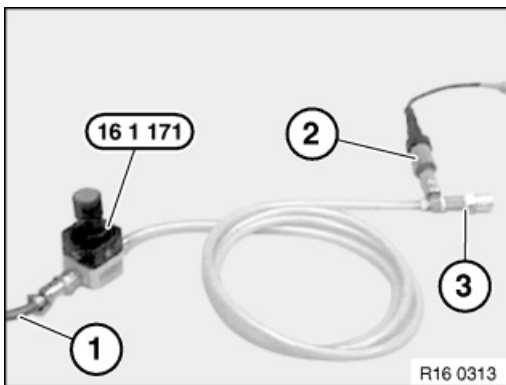
Remove fuel filler cap and connect special tool 16 1 174 to fuel filler neck.

Clamp special tool 16 1 174 on fuel filler neck with adjusting wheel (1).



Important!

Turn pressure regulator on special tool 16 1 171 counterclockwise up to stop.



Connect special tool 16 1 171 using compressed air line (1) to garage compressed air system (8 ... 10 bar).

Connect pressure sensor (2) from Diagnosis and Information System with a measuring range of 0 ... 25 bar.

Important!

Do not yet connect fast-release coupling (3) of special tool 16 1 171 .



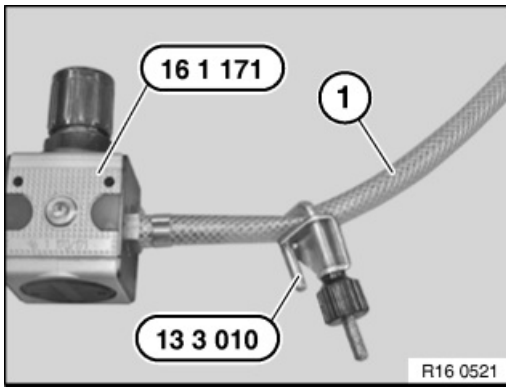
1. Select "Measurement" function on Diagnosis and Information System (DIS).
2. Using pressure regulator on special tool 16 1 171 , increase pressure by 0.20 bar.
3. Connect special tool 16 1 174 to fast-release coupling of special tool 16 1 171 .
4. Wait until the value at the Diagnosis and Information System has levelled out.
5. Using pressure regulator on special tool 16 1 171 , reset gauge pressure in fuel tank to 0.20 bar.



Important!

Do not under any circumstances increase pressure by more than 0.30 bar as this would result in damage to the fuel tank and venting system.





Using special tool 13 3 010 , disconnect delivery line from special tool 16 1 171 to fuel filler neck.

Allow a rest period of approx. 20 sec.

Read off and note down starting pressure value.

Wait approx. 120 sec.

Read off final pressure value and compare with starting pressure value.



Measurement evaluation:

- Pressure drop up to 0.01 bar:
System OK
- Pressure drop over 0.02 bar:
System leaking beyond permitted levels

If the system is leaking, a leak test must be carried out and the defective components replaced.





Necessary preliminary tasks:

- Pressurise fuel tank and tank ventilation system

Note:

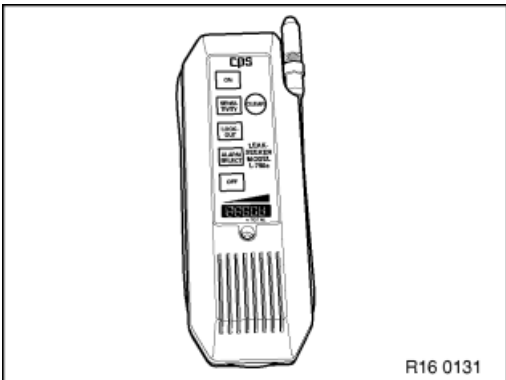
During the leak detection with a leak detector, be sure to follow the operating instructions of the equipment manufacturer.



Important!

Emerging fuel vapours. Carry out all work in well ventilated rooms or use a suitable extractor system.

Observe country-specific accident prevention and occupational safety regulations.



The leak detection can be carried out with a leak detector.

Possible causes may be:

- Tank cap leaky
- Tank ventilation lines leaky (fuel tank; carbon canister; tank vent valve)
- Tank vent valve leaky (engine compartment)
- Fuel-level sensor in tank leaking



**Recycling**

Fuel escapes when fuel lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

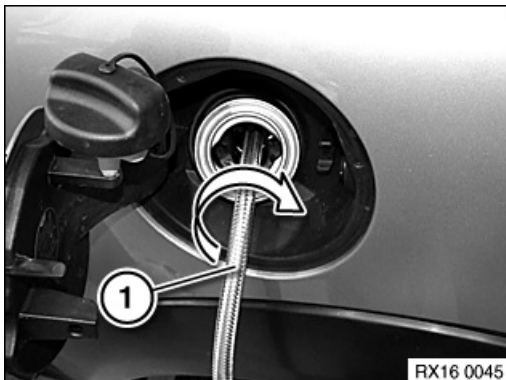
**Important!**

- Make sure the work bay is adequately ventilated.
- Carefully withdraw extraction hose so as not to damage non-return flap.
- The electric fuel pump must not operate without fuel!
- On conclusion of repair work and before starting the engine for the first time, the fuel tank must be filled via the fuel filler pipe with at least 5 litres of fuel.

**Drawing off fuel: Important!**

The fuel can only be partially extracted via the fuel filler neck.

The delivery unit must be removed in order to extract the remaining quantity of fuel!



Feed suction hose (1) of extractor unit (refer to BMW Workshop Equipment & Planning Documentation) into filler pipe. In so doing, turn hose slightly if necessary.

Insertion length: 120 cm

Draw off fuel with suction extractor unit as far as possible.

Observe the fuel gauge in the instrument cluster while extracting fuel.

**Drawing off residual fuel quantity:****Important!**

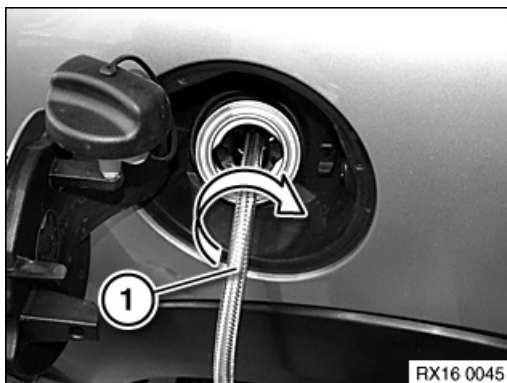
Make sure vehicle interior is adequately ventilated.

Catch dripping fuel in a suitable container.

Remove delivery unit (right).

Extract fuel through installation openings.



**Fuel filling:**

Slide suction hose (1) of extractor unit approx. 40 cm into fuel filler pipe.
In so doing, turn hose slightly if necessary.

Fill fuel from suction extractor unit.



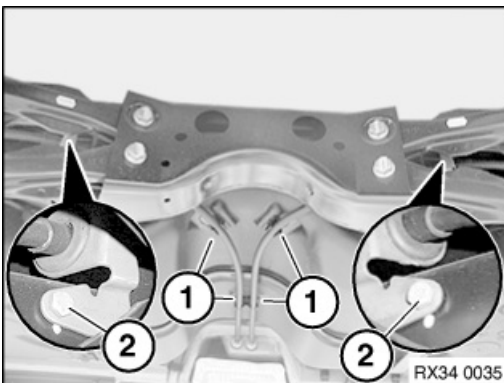
**Important!**

After installation of fuel tank/prior to first engine start-up:

- Check electrical resistance between metal filler bowl and wheel hub.
- Measured value: approx. 0.65 Ω .
- Fill fuel tank with at least 5 litres of fuel.

**Necessary preliminary work:**

- Extract fuel from fuel tank
- Remove fuel tank underbody panelling on left and right
- Remove exhaust system (only front wheel drive)
- Remove propeller shaft (four-wheel drive only).
- Remove heat shield.
- Remove rear left wheel arch trim
- Detach parking brake bowden cable at brake calliper on left and right.



Release bolts (2) from rear axle support.

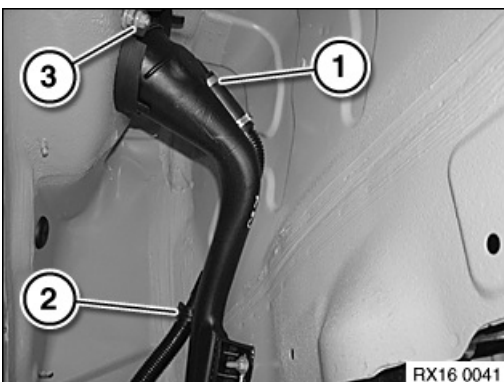
Installation note:

Tightening torque 34 41 2AZ.

Disengage parking brake Bowden cables from brackets (1) and feed out through rear axle support.

Note:

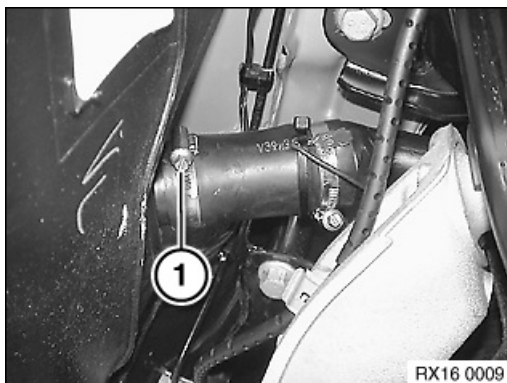
Parking brake bowden cables remain attached to parking brake lever.



Release snap fastener (1) and disengage fuel filler neck breather pipe from bracket (2). *Installation note:*

Make sure the quick-release fastener snaps in correctly.

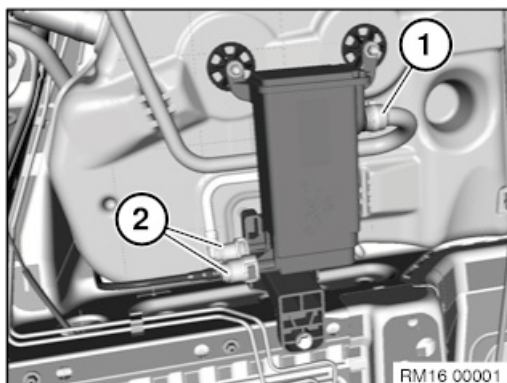




Release hose clamp (1) and remove filler hose from fuel tank.

Installation note:

Tightening torque 16 11 4AZ.

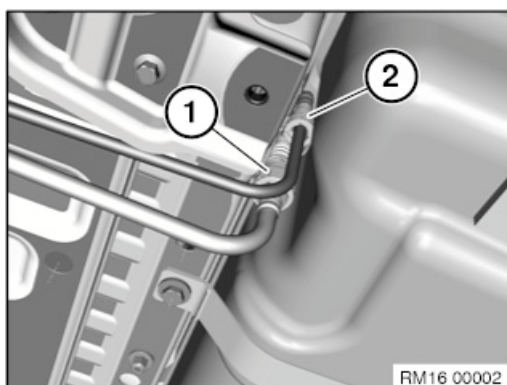


Unlock snap fastener (1) on carbon canister and detach.

Unlock snap fasteners (2) on carbon canister and detach.

Installation note:

Make sure snap fasteners engage correctly.



Detach snap fastener (1).

Disconnect fuel feed line (2).

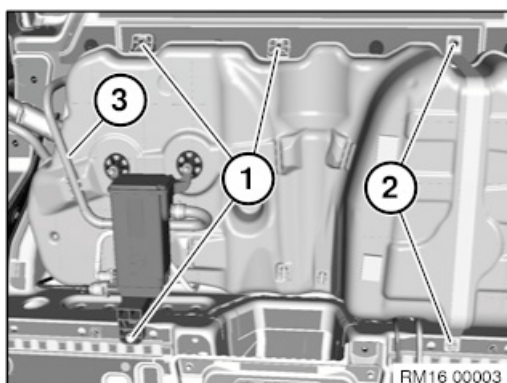
Installation note:

Make sure snap fasteners engage correctly.



Important!

Secure fuel tank over a wide area with a suitable workshop jack and secure against falling down.



Release screw connections (1).

Release screw connections (2) and lower fuel tank a little.

Unclip tank ventilation line (3) at fuel tank.

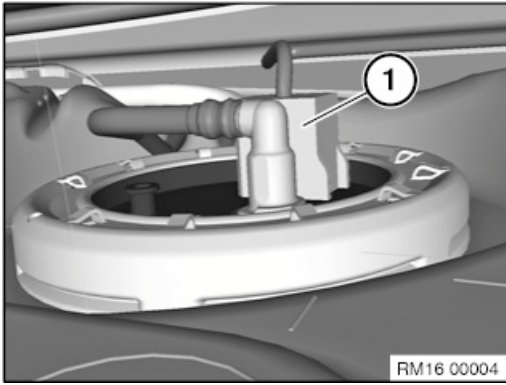
Installation note:

Tank ventilation line (3) must correctly engage at fuel tank.

Replace self-locking nuts.

Tightening torque 16 11 3AZ.





Disconnect plug connection (1).

Pass filler vent line through body and slowly lower fuel tank.

Installation note:

Make sure that snap fastener is correctly engaged.

Make sure lines and wiring harness are not trapped or crushed during installation.



The following components must be modified when the fuel tank is replaced:

- Fuel pump
- Carbon canister



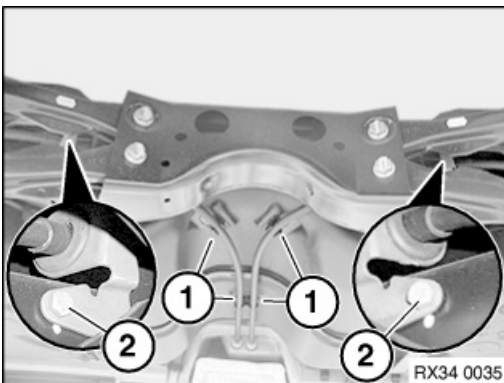
**Important!**

After installation of fuel tank/prior to first engine start-up:

- Check electrical resistance between metal filler bowl and wheel hub.
- Measured value: approx. 0.65 Ω .
- Fill fuel tank with at least 5 litres of fuel.

**Necessary preliminary work:**

- Extract fuel from fuel tank
- Remove fuel tank underbody panelling on left and right
- Remove exhaust system (only front wheel drive)
- Remove propeller shaft (four-wheel drive only).
- Remove heat shield.
- Remove rear left wheel arch trim
- Detach parking brake bowden cable at brake calliper on left and right.



Release bolts (2) from rear axle support.

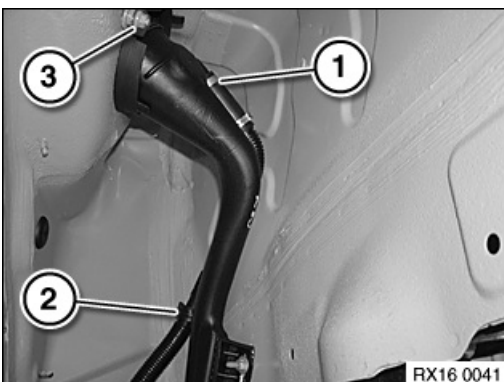
Installation note:

Tightening torque 34 41 2AZ.

Disengage parking brake Bowden cables from brackets (1) and feed out through rear axle support.

Note:

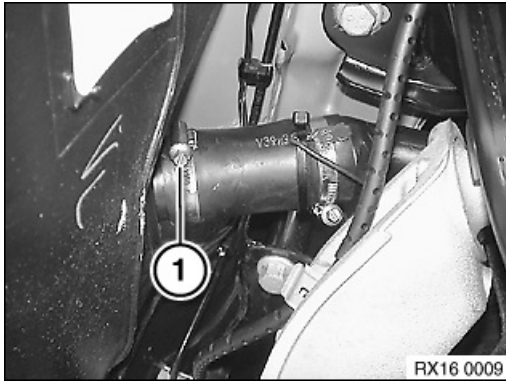
Parking brake bowden cables remain attached to parking brake lever.



Release snap fastener (1) and disengage fuel filler neck breather pipe from bracket (2). *Installation note:*

Make sure the quick-release fastener snaps in correctly.

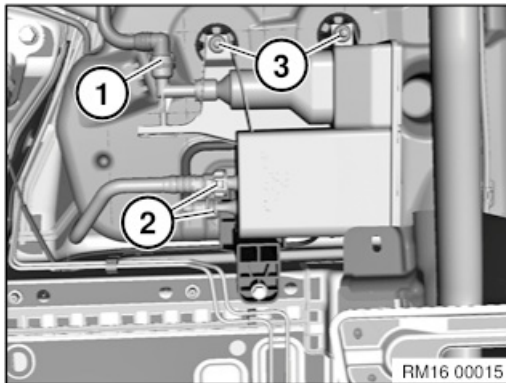




Release hose clamp (1) and remove filler hose from fuel tank.

Installation note:

Tightening torque 16 11 4AZ.

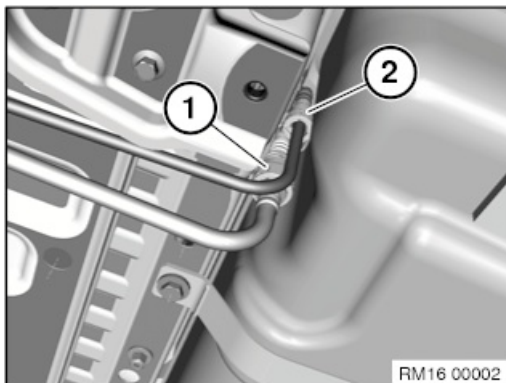


Unlock snap fastener (1) on carbon canister and detach.

Unlock snap fasteners (2) on carbon canister and detach.

Installation note:

Make sure snap fasteners engage correctly.



Detach snap fastener (1).

Disconnect fuel feed line (2).

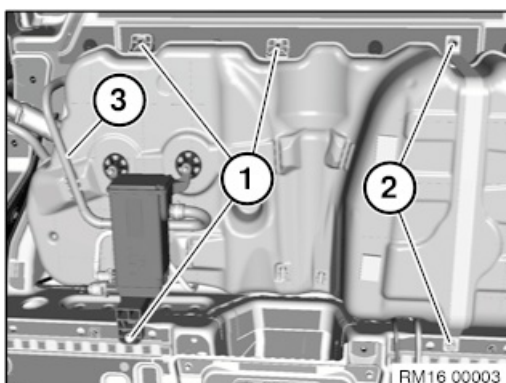
Installation note:

Make sure snap fasteners engage correctly.



Important!

Secure fuel tank over a wide area with a suitable workshop jack and secure against falling down.



Release screw connections (1).

Release screw connections (2) and lower fuel tank a little.

Unclip tank ventilation line (3) at fuel tank.

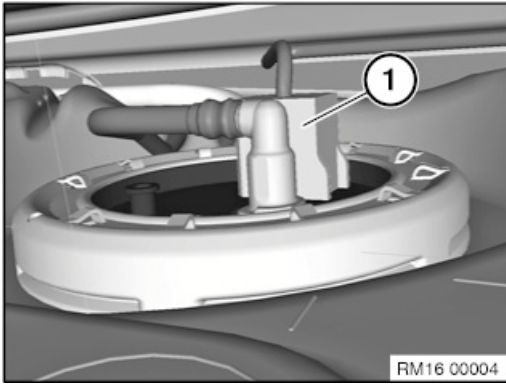
Installation note:

Tank ventilation line (3) must correctly engage at fuel tank.

Replace self-locking nuts.

Tightening torque 16 11 3AZ.





Disconnect plug connection (1).

Pass filler vent line through body and slowly lower fuel tank.

Installation note:

Make sure that snap fastener is correctly engaged.

Make sure lines and wiring harness are not trapped or crushed during installation.



The following components must be reinstalled when the fuel tank is replaced:

- Fuel pump
- Carbon canister



**Special tools required:**

- 16 1 020

**Recycling**

Fuel escapes when fuel lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

**Important!**

Ensure adequate ventilation in the workbay!

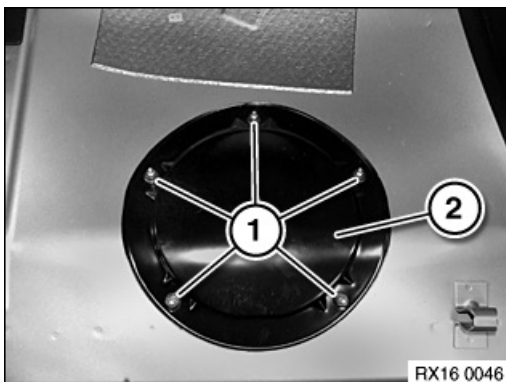
Avoid skin contact (wear gloves)!

Before starting the engine for the first time:

- Fill fuel tank with at least 5 litres of fuel.

**Necessary preliminary tasks:**

- Extract fuel from fuel tank
- Remove right rear seat

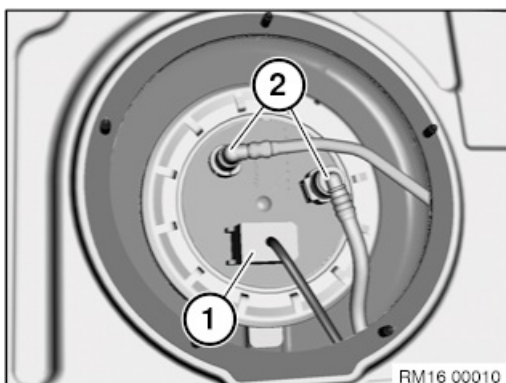


Fold carpet forwards slightly.

Release nuts (1) and remove cover (2).

Installation note:

Tightening torque 16 11 2AZ.



Disconnect plug connection (1).

Unlock and detach snap fastener (2).

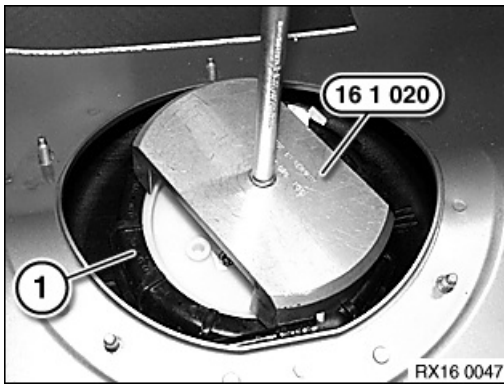
Installation note:

Make sure that snap fastener is correctly engaged.

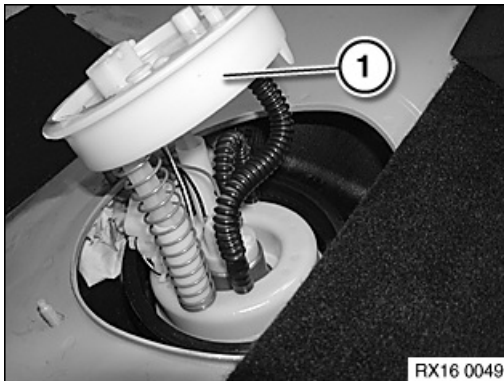
Important!

Catch escaping fuel in a suitable collecting vessel.





Release screw cap (1) with special tool 16 1 020 .*Installation note:*
Replace screw cap (1).
Replace rubber gasket.
Tightening torque 16 14 2AZ.
When tightening, ensure that the delivery unit is not twisted!



Carefully feed fuel pump (1) out of fuel tank.**Important!**
Do not bend sensor arm.
Catch escaping petrol/gasoline.



**Special tools required:**

- 16 1 020

**Recycling**

Fuel escapes when fuel lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

**Important!**

Ensure adequate ventilation in the workbay!

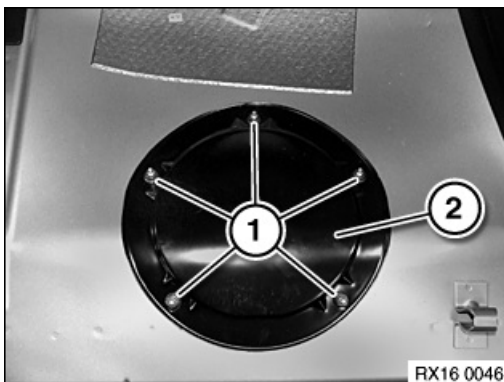
Avoid skin contact (wear gloves)!

Before starting the engine for the first time:

- Fill fuel tank with at least 5 litres of fuel.

**Necessary preliminary work:**

- Extract fuel from fuel tank
- Remove right rear seat

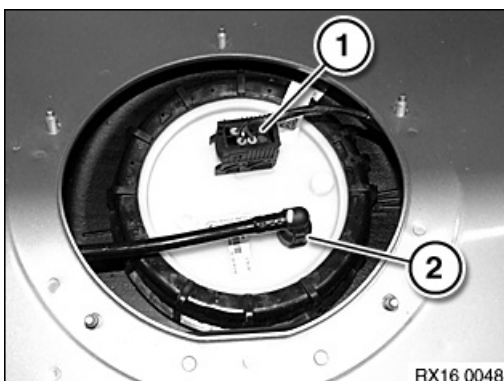


Fold carpet forwards slightly.

Release nuts (1) and remove cover (2).

Installation note:

Tightening torque 16 11 2AZ.



Disconnect plug connection (1).

Unlock and disconnect snap fastener (2).

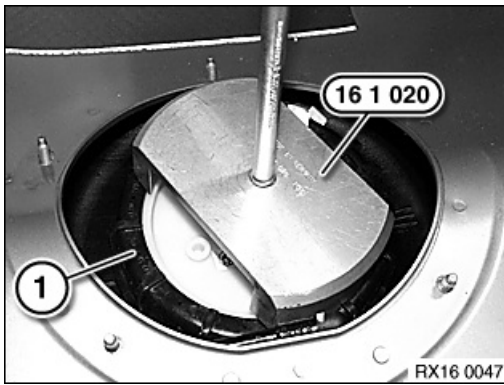
Installation note:

Make sure that snap fastener is correctly engaged.

Important!

Catch escaping fuel in a suitable collecting vessel.





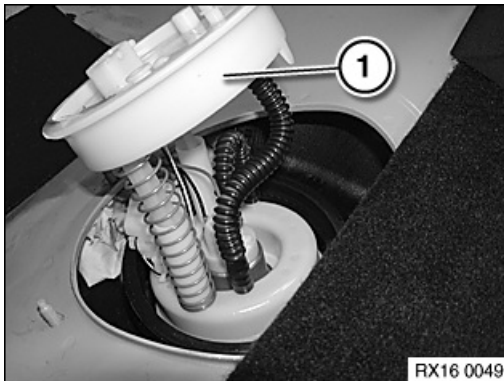
Release screw cap (1) with special tool 16 1 020 .*Installation note:*

Replace screw cap (1).

Replace rubber gasket.

Tightening torque 16 14 2AZ.

When tightening, ensure that the delivery unit is not twisted!



Carefully feed fuel pump (1) out of fuel tank.**Important!**

Do not bend sensor arm.

Catch escaping petrol/gasoline.



**Recycling**

Fuel escapes when fuel lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

**Important!**

Ensure adequate ventilation in the workbay!

Avoid skin contact (wear gloves)!

After installation of fuel tank/prior to first engine start-up:

- Check electrical resistance between metal filler bowl and wheel hub.
- Measured value: approx. 0.65 Ω .
- Fuel tank must be filled with at least 5 litres of fuel.

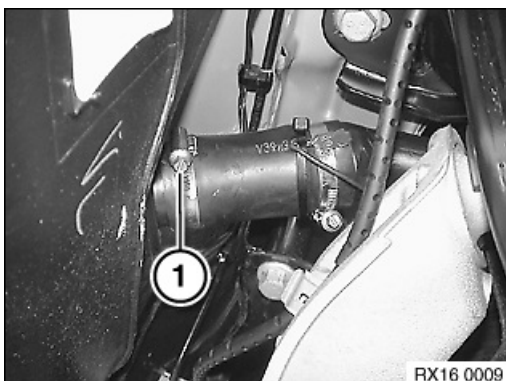
*Note:*

For diesel engines:

Drawn-off diesel fuel must not be mixed with other diesel fuel.

*Necessary preliminary work:*

- Extract fuel from fuel tank
- Remove rear left wheel arch cover
- Remove underbody cover on left
- Unscrew fuel filler cap from fuel filler neck



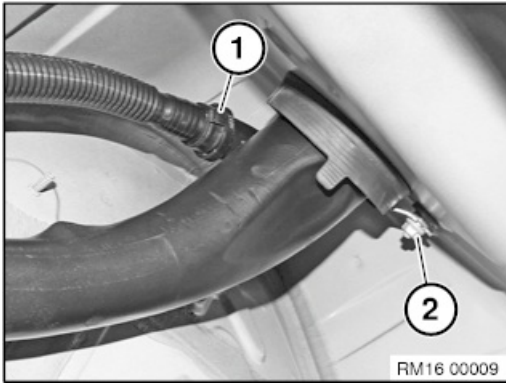
Unfasten hose clamp (1).

Detach fuel hose from fuel tank.

Installation note:

Tightening torque 16 11 4AZ.





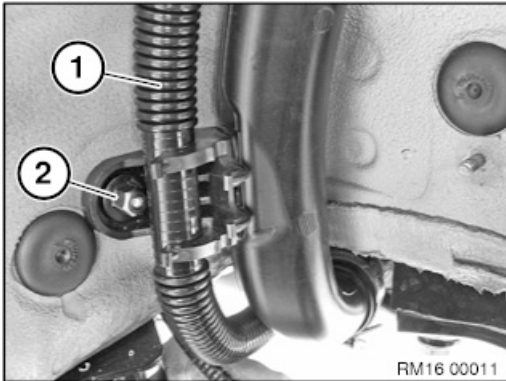
Unlock and disconnect quick-connect coupling (1).

Slacken nut (2).

Installation note:

Replace nut.

Tightening torque 16 11 1AZ.



Detach vent line (1) from holder.

Slacken nut (2).

Installation note:

Replace plastic nut.

Tightening torque 16 11 1AZ.

Remove fuel filler pipe.

Installation note:

Following seals must be correctly fitted:

- Fuel filler pipe to body cutout



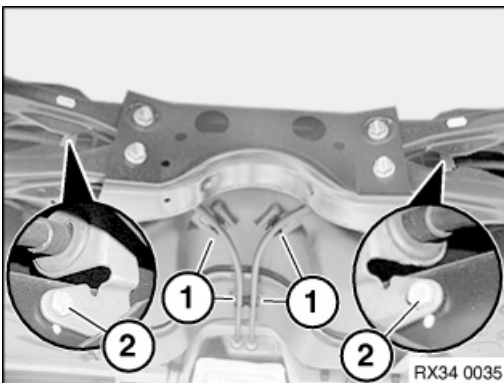
**Important!**

After installation of fuel tank/prior to first engine start-up:

- Check electrical resistance between metal filler bowl and wheel hub.
- Measured value: approx. 0.65 Ω .
- Fill fuel tank with at least 5 litres of fuel.

**Necessary preliminary work:**

- Extract fuel from fuel tank
- Remove fuel tank underbody panelling on left and right
- Remove exhaust system (only front wheel drive)
- Remove propeller shaft (only all-wheel drive).
- Remove heat shield.
- Remove rear left wheel arch trim
- Detach parking brake bowden cable at brake calliper on left and right.



Release bolts (2) from rear axle carrier.

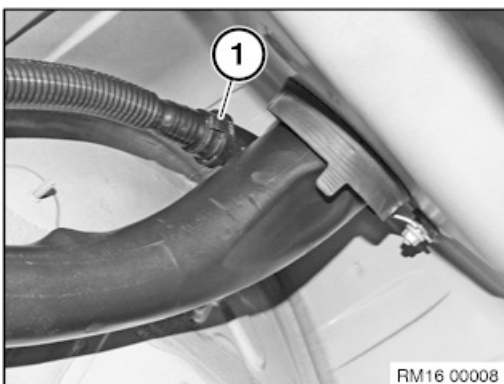
Installation note:

Tightening torque 34 41 2AZ.

Disengage parking brake Bowden cables from holders (1) and feed out through rear axle carrier.

Note:

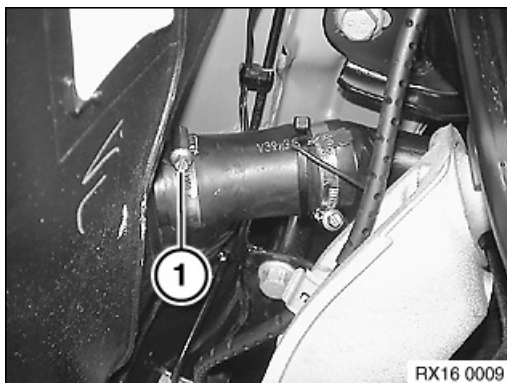
Parking brake bowden cables remain attached to parking brake lever.



Release quick-action retainer (1) and detach filler vent line from holder. *Installation note:*

Make sure the quick-release fastener snaps in correctly.

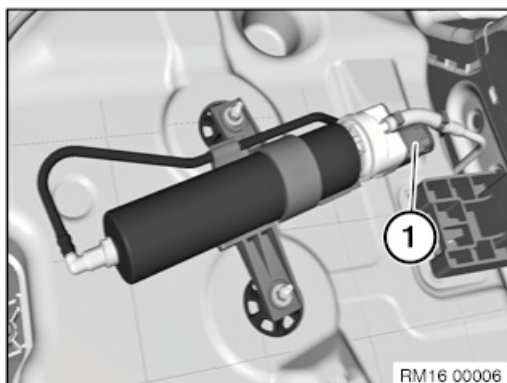




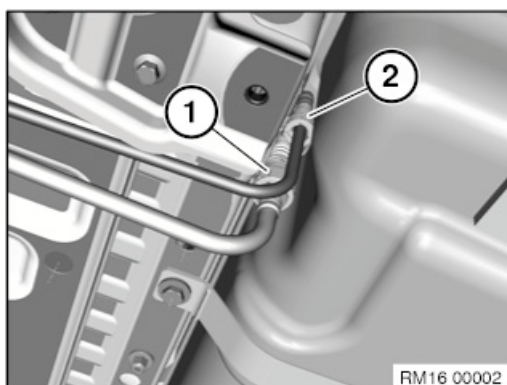
Release hose clamp (1) and remove filler hose from fuel tank.

Installation note:

Tightening torque 16 11 4AZ.



Disconnect plug connection (1).



Detach quick-release fastener (1).

Disconnect fuel feed line (2).

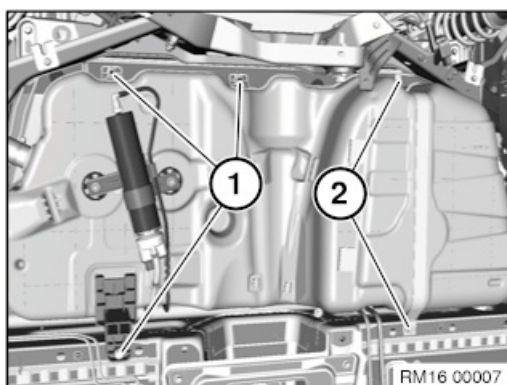
Installation note:

Make sure quick-release fasteners engage correctly.



Important!

Secure fuel tank over a wide area with a suitable workshop jack and secure against falling down.



Release screw connections (1).

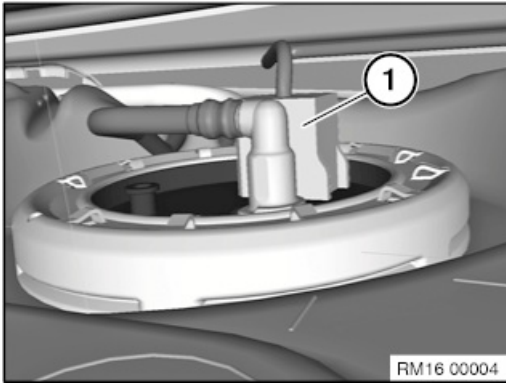
Release screw connections (2) and lower fuel tank a little.

Installation note:

Replace self-locking nuts.

Tightening torque 16 11 3AZ.





Disconnect plug connection (1).

Pass filler vent line through body and slowly lower fuel tank.

Installation note:

Make sure that quick-release fastener is correctly engaged.

Make sure lines and wiring harness are not trapped or crushed during installation.



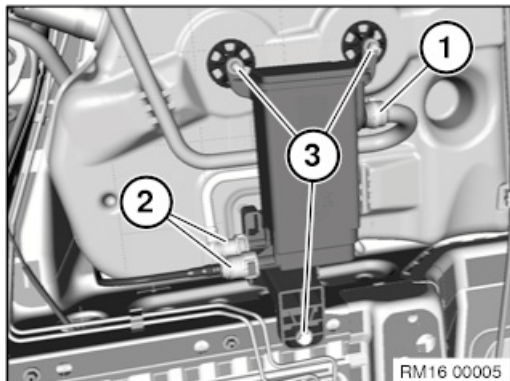
The following components must be reinstalled when the fuel tank is replaced:

- Fuel pump
- Fuel filter



**Necessary preliminary tasks:**

- Remove underbody cover on left



Unlock and disconnect snap fastener (1).

Unlock and detach snap fastener (2).

Release screw connections (3) and remove carbon canister.

Installation note:

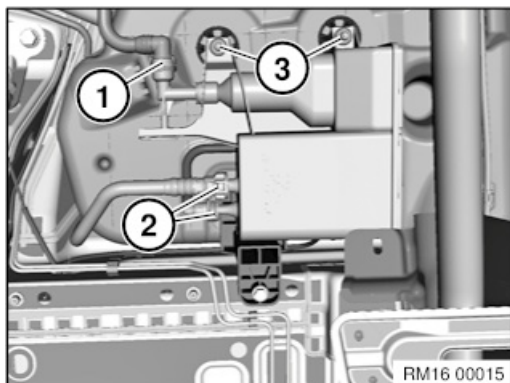
Make sure snap fasteners engage correctly.





Necessary preliminary work:

- Remove underbody cover on left



Unlock and disconnect snap fastener (1).

Unlock and detach snap fastener (2).

Release screw connections (3) and remove carbon canister.

Installation note:

Make sure snap fasteners engage correctly.



**Special tools required:**

- 16 1 020

**Recycling**

Fuel escapes when fuel lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

**Important!**

Ensure adequate ventilation in the workbay!

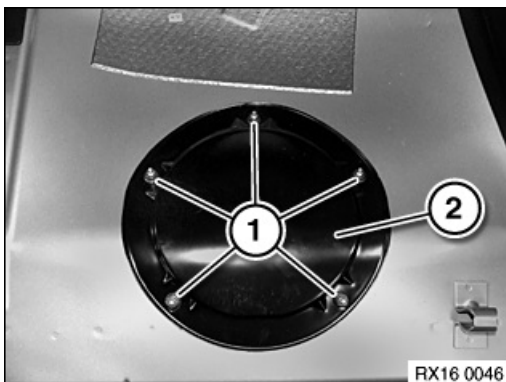
Avoid skin contact (wear gloves)!

Before starting the engine for the first time:

- Fill fuel tank with at least 5 litres of fuel.

**Necessary preliminary tasks:**

- Extract fuel from fuel tank
- Remove right rear seat

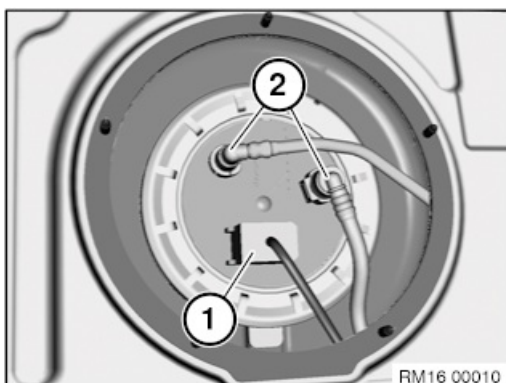


Fold carpet forwards slightly.

Release nuts (1) and remove cover (2).

Installation note:

Tightening torque 16 11 2AZ.



Disconnect plug connection (1).

Unlock and detach snap fastener (2).

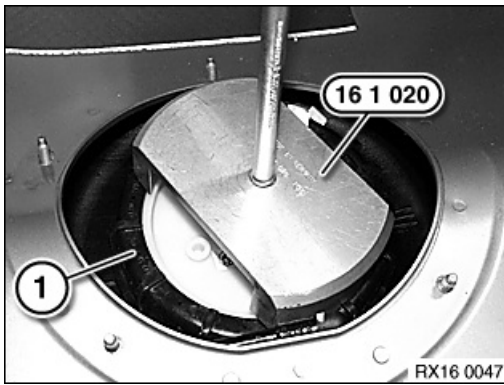
Installation note:

Make sure that snap fastener is correctly engaged.

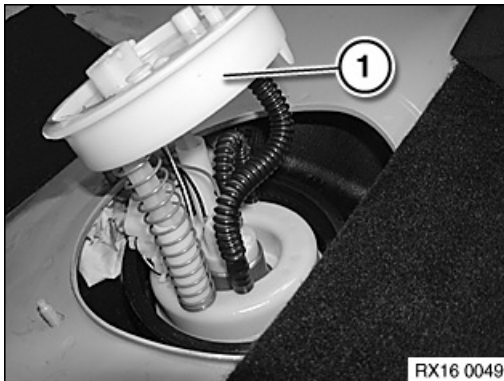
Important!

Catch escaping fuel in a suitable collecting vessel.





Release screw cap (1) with special tool 16 1 020 .*Installation note:*
Replace screw cap (1).
Replace rubber gasket.
Tightening torque 16 14 2AZ.
When tightening, ensure that the delivery unit is not twisted!



Carefully feed fuel pump (1) out of fuel tank.**Important!**
Do not bend sensor arm.
Catch escaping petrol/gasoline.



**Special tools required:**

- 16 1 020

**Recycling**

Fuel escapes when fuel lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

**Important!**

Ensure adequate ventilation in the workbay!

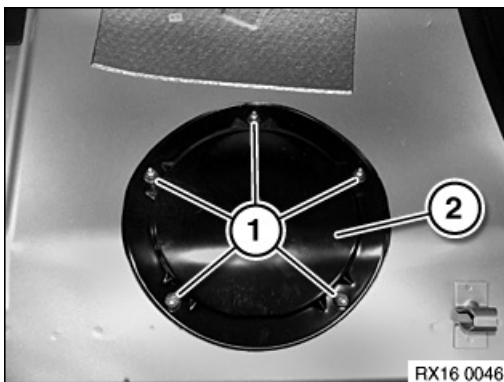
Avoid skin contact (wear gloves)!

Before starting the engine for the first time:

- Fill fuel tank with at least 5 litres of fuel.

**Necessary preliminary work:**

- Extract fuel from fuel tank
- Remove right rear seat

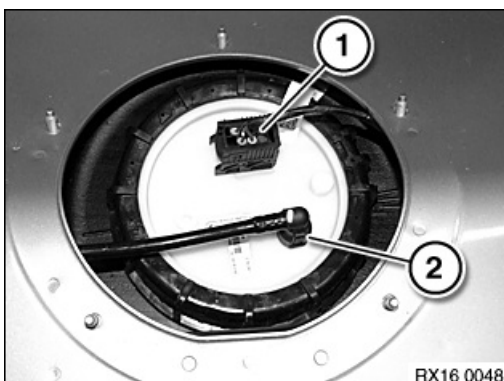


Fold carpet forwards slightly.

Release nuts (1) and remove cover (2).

Installation note:

Tightening torque 16 11 2AZ.



Disconnect plug connection (1).

Unlock and disconnect snap fastener (2).

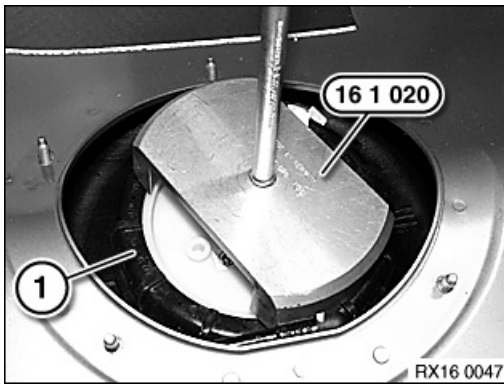
Installation note:

Make sure that snap fastener is correctly engaged.

Important!

Catch escaping fuel in a suitable collecting vessel.





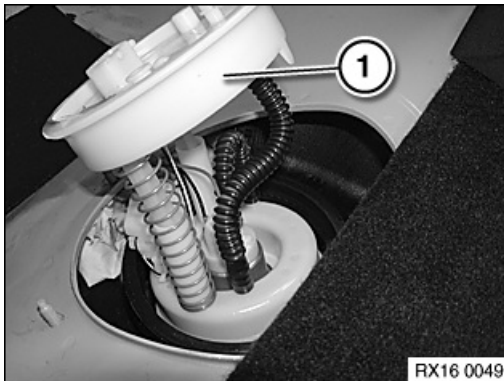
Release screw cap (1) with special tool 16 1 020 .*Installation note:*

Replace screw cap (1).

Replace rubber gasket.

Tightening torque 16 14 2AZ.

When tightening, ensure that the delivery unit is not twisted!



Carefully feed fuel pump (1) out of fuel tank.**Important!**

Do not bend sensor arm.

Catch escaping petrol/gasoline.

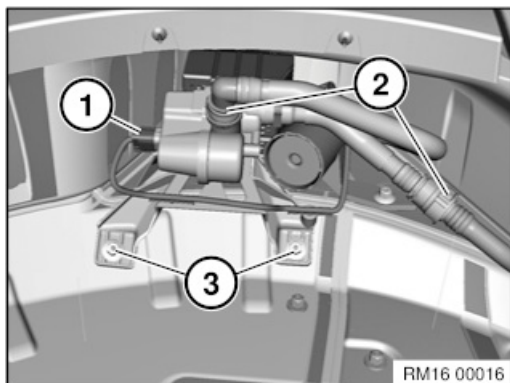


16 13 015 Removing and installing/replacing tank leak diagnosis module (petrol/gasoline vehicles with US DMTL version)



Necessary preliminary work:

- Remove rear right wheel arch panel.

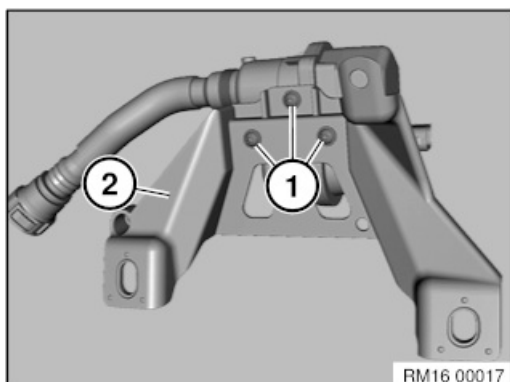


Disconnect plug connection (1).

Unlock and detach snap fastener (2).

Release screws (3).

Remove tank leak diagnosis module with holder.



If replacing the tank leak diagnosis module:

Release screws (1) and convert holder (2).



**Special tools required:**

- 16 1 020

**Recycling**

Fuel escapes when fuel lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

**Important!**

Ensure adequate ventilation in the workbay!

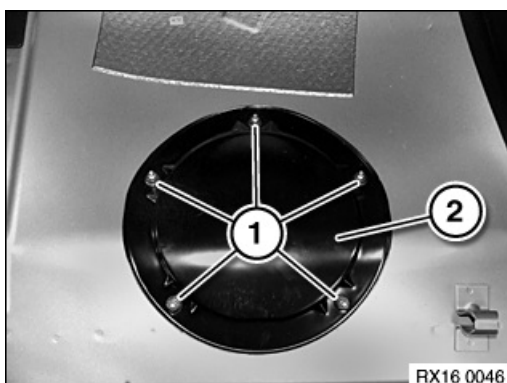
Avoid skin contact (wear gloves)!

Before starting the engine for the first time:

- Fill fuel tank with at least 5 litres of fuel.

**Necessary preliminary tasks:**

- Extract fuel from fuel tank
- Remove right rear seat

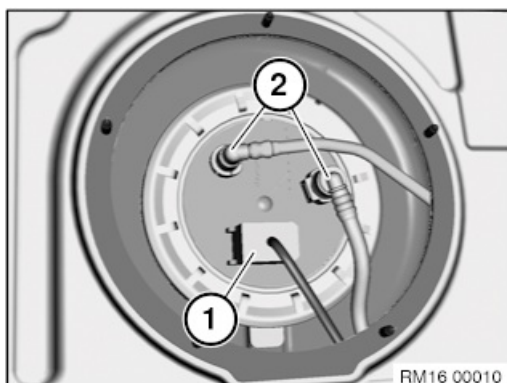


Fold carpet forwards slightly.

Release nuts (1) and remove cover (2).

Installation note:

Tightening torque 16 11 2AZ.



Disconnect plug connection (1).

Unlock and detach snap fastener (2).

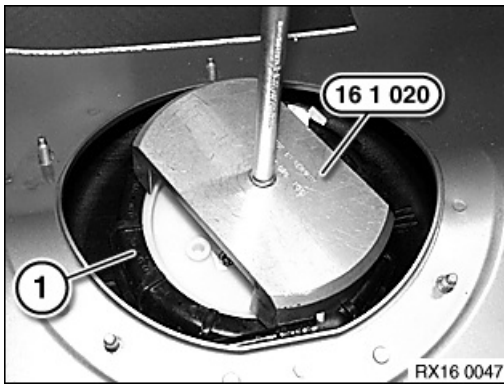
Installation note:

Make sure that snap fastener is correctly engaged.

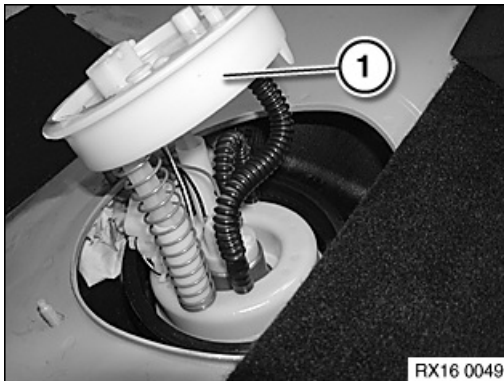
Important!

Catch escaping fuel in a suitable collecting vessel.





Release screw cap (1) with special tool 16 1 020 .*Installation note:*
Replace screw cap (1).
Replace rubber gasket.
Tightening torque 16 14 2AZ.
When tightening, ensure that the delivery unit is not twisted!



Carefully feed fuel pump (1) out of fuel tank.**Important!**
Do not bend sensor arm.
Catch escaping petrol/gasoline.



**Special tools required:**

- 16 1 020

**Recycling**

Fuel escapes when fuel lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

**Important!**

Ensure adequate ventilation in the workbay!

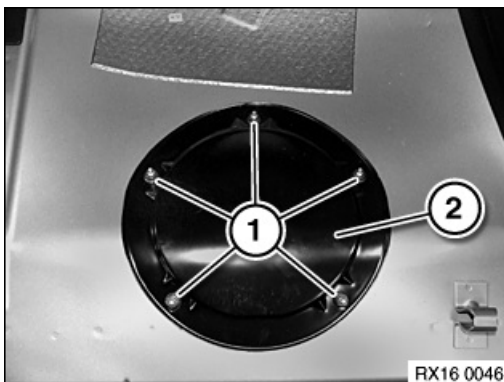
Avoid skin contact (wear gloves)!

Before starting the engine for the first time:

- Fill fuel tank with at least 5 litres of fuel.

**Necessary preliminary work:**

- Extract fuel from fuel tank
- Remove right rear seat

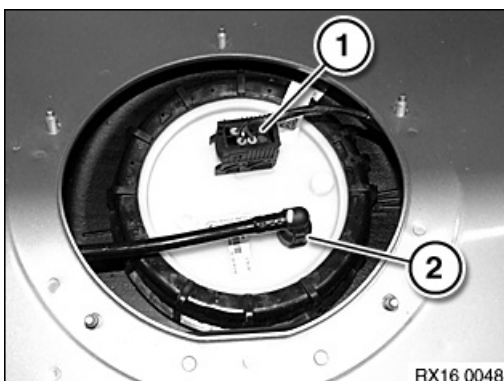


Fold carpet forwards slightly.

Release nuts (1) and remove cover (2).

Installation note:

Tightening torque 16 11 2AZ.



Disconnect plug connection (1).

Unlock and disconnect snap fastener (2).

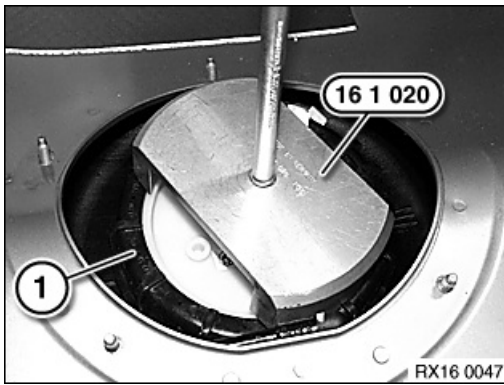
Installation note:

Make sure that snap fastener is correctly engaged.

Important!

Catch escaping fuel in a suitable collecting vessel.





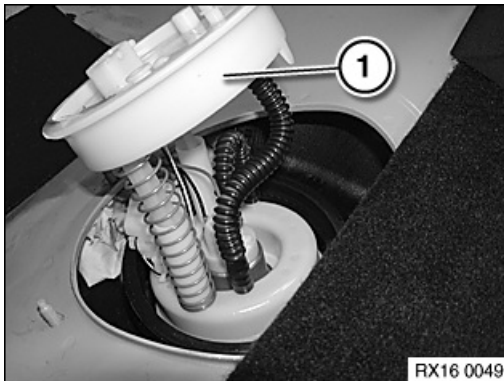
Release screw cap (1) with special tool 16 1 020 .*Installation note:*

Replace screw cap (1).

Replace rubber gasket.

Tightening torque 16 14 2AZ.

When tightening, ensure that the delivery unit is not twisted!



Carefully feed fuel pump (1) out of fuel tank.**Important!**

Do not bend sensor arm.

Catch escaping petrol/gasoline.

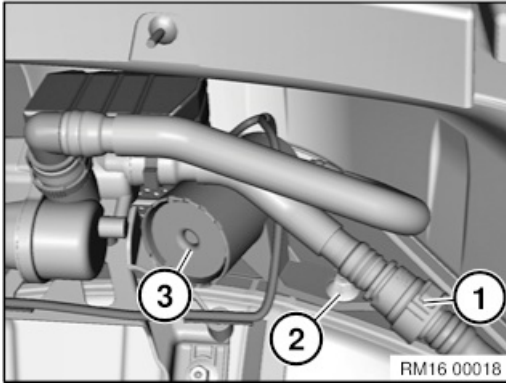


16 14 060 Removing and installing/replacing dust filter for tank leak diagnosis module (DMTL)



Necessary preliminary work:

- Remove rear right wheel arch panel.



Unlock and disconnect snap fastener (1).

Release nut (2) and remove dust filter (3).



64 00 ... Information on using cleaning agent/paints (personal protection equipment)



Warning!

Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!

Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!



Important!

Observe following instructions:

- Store cleaning agents/paints only in a secure cabinet.
- Keep cleaning agents/paints away from naked flames and other sources of ignition.
- Protect cleaning agents/paints from high temperatures and direct sunlight.
- Always keep an eye douche on hand, change the water regularly (once a month).



Important!

Observe following instructions before use:

- Manufacturer's instructions (on container/packaging)
- Hazard warnings (on container/packaging)
- Manufacturer's instructions on package insert
- Material safety data sheet of manufacturer
- Product information in EPC
- National market regulations



Important!

Observe following instructions during use:

- Do not eat, drink or smoke while working with these products.
- Avoid direct contact with skin and eyes.
- Wear personal protective clothing/equipment.
- Ensure that all enclosed areas are well ventilated or extract fumes directly.
- Immediately change working clothes soiled with cleaning agent/paint.
- After finishing work, wash your hands and apply protective skin cream.



Important!

Follow hazard warnings and wear personal protection equipment!





First Aid:

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapours ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.



Recycling:

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.



**Special tools required:**

- 00 2 030
- 17 0 100

Type	Engine	Adapter Y from 17 0 100
E60/E61/E63/E64	All	17 0 113
E65/E66	M54/N52/N62/N62T/N73	17 0 105
E65/E66	M57S/M57T/M67/M67T	17 0 113
E70/E71/E72	All	17 0 113
E81/E82/E84/E87/E88/E89	All	17 0 113
E83	M54/N46/N52K	17 0 105
E83	M47S/M57S/M57T/M57Y/N47	17 0 113
E85/E86	All	17 0 105
E90/E91/E92/E93	All	17 0 113
R50/R52	W10	17 0 107 and 17 0 102
R50	W17	17 0 109
R52/R53	W11	17 0 109
R55/R56/R57/R58/R60/R61	All	17 0 109
F25/F26	All	17 0 113
F20/F21/F22/F23/F30/F31/F32/F33/F34/F35/F36/F87	All	17 0 113
F80/F82/F83	S55	17 0 113
F15/F16	All	17 0 113
F54/F55/F56/F57/F60	All	17 0 109
F45/F46/F48/F52	All	17 0 109
F85/F86	All	17 0 113

**Attention!****Life-time coolant filling:**

Never reuse used coolant!

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of part quantities of coolant, replace these quantities which have been drained with new coolant.



**Attention!**

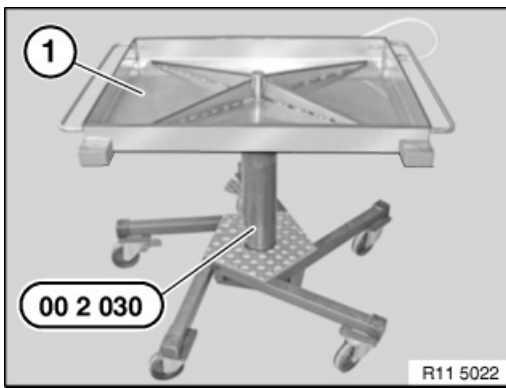
You must protect the alternator against contamination by coolant when carrying out repair work on the cooling circuit.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

**Ordering information:**

- Workshop equipment
- Workshop equipment catalogue
- Vacuum filler device, order number 81 39 2 152 473
- Drip pan, order number 81 49 2 152 347
- Adapter: 17 0 100

**Attention!**

Risk of slipping due to coolant on the floor.

Danger of injury!

Catch and dispose of emerging coolant in drip tray (1) and if necessary special tool 00 2 030 (universal jack). **Recycling:**

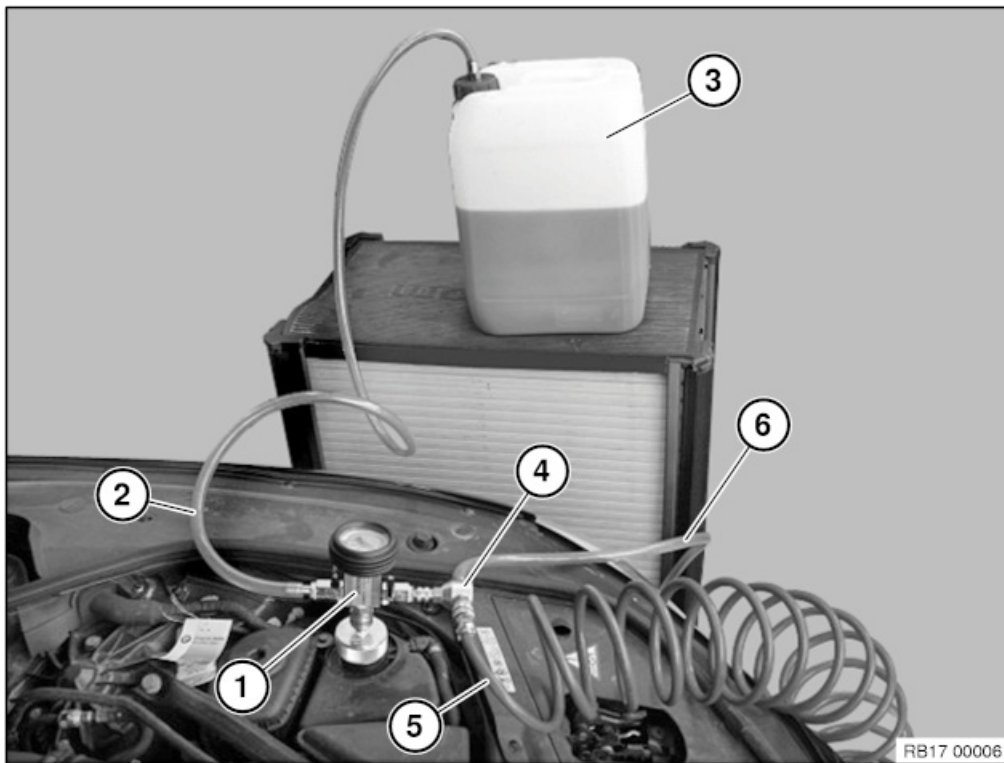
Observe country-specific waste disposal regulations.

**Attention!**

All coolant hoses must be checked before filling cooling system with vacuum filling unit.

If necessary, replace damaged and porous coolant hoses.





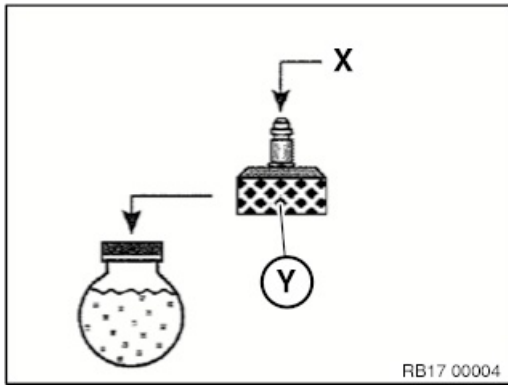
- 1) Vacuum filler device with pressure gauge and shutoff valves
- 2) Filler hose
- 3) Coolant container
- 4) Venturi nozzle
- 5) Compressed air connection (max. 6 bar)
- 6) Outgoing-air hose (lead outgoing-air hose into a collecting container)



Preconditions

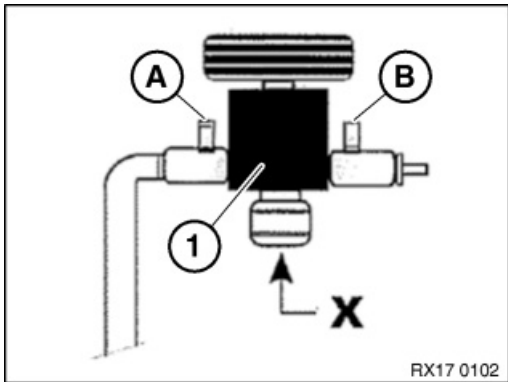
- Cooling system expansion tank must be empty.
- There must be sufficient premixed coolant in the vacuum filler device collecting vessel, 1–2 litres more than the filling capacity prescribed for the vehicle.
 - Use only recommended coolant.
 - Observe mixture ratio.
 - Observe capacities.
- Position the vacuum filler device container at the same height as the coolant expansion tank.
- Compressed-air connection with 6 bar pressure present.
- Set heating to maximum temperature.





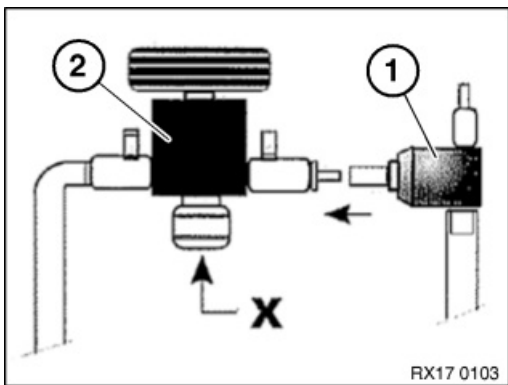
Select adapter (Y) according to table and connect to coolant expansion tank.

Connect vacuum filling unit to adapter connection (X).



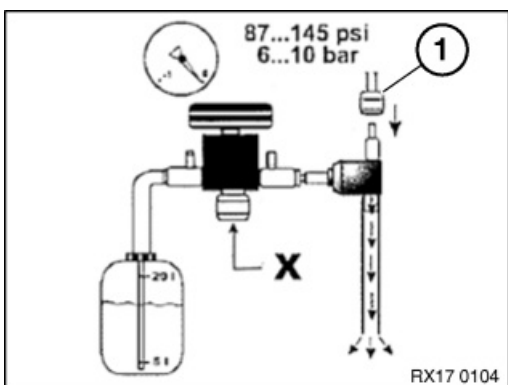
Shutoff valves (A) and (B) of the vacuum filler device (1) must be closed.

(X) Expansion tank connection



Connect Venturi nozzle (1) to vacuum filling unit (2).

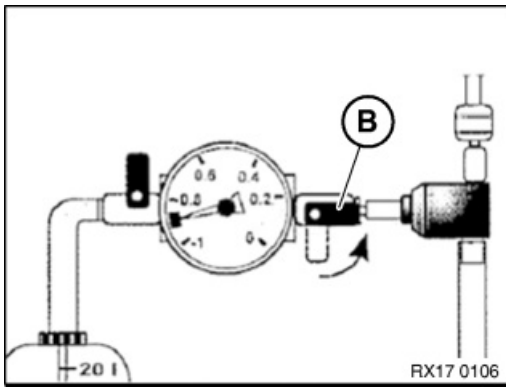
(X) Expansion tank connection



Connect compressed air (1).

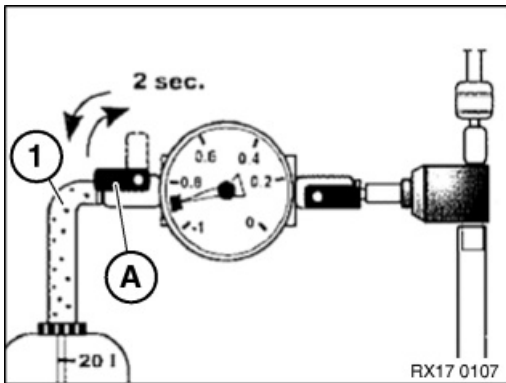
(X) Expansion tank connection



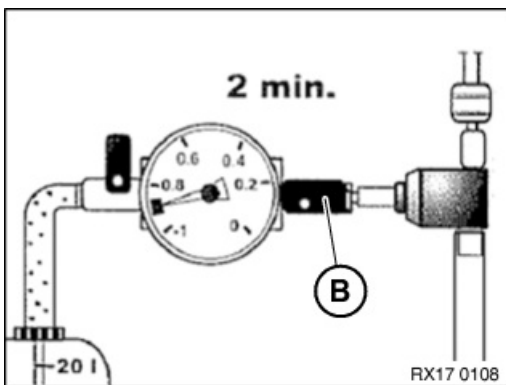


Open shutoff valve (B).

The venturi nozzle produces a flow noise.



Then open shutoff valve (A) until the filling hose (1) is free of bubbles.
Close shutoff valve (A) again. The filling hose (1) is vented in this way.

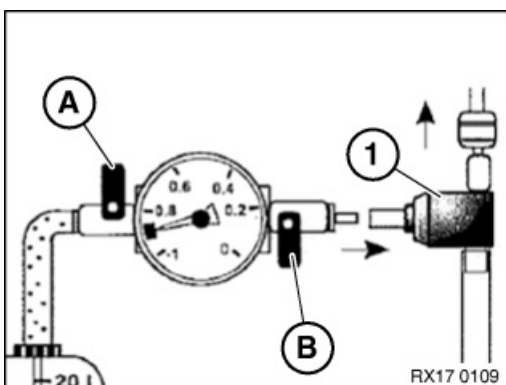


Shutoff valve (B) will remain open. Generate vacuum in coolant system for approx. 2 minutes. The final vacuum is reached at a vacuum of -0.7 to -0.95 bar. Green scale in the pressure gauge.

Note:

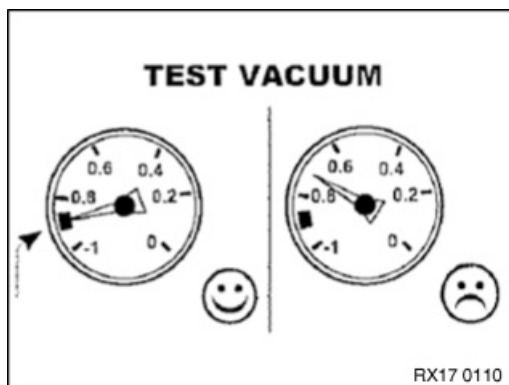
The coolant hoses contract during vacuum build-up.

Then close shutoff valve (B) again.

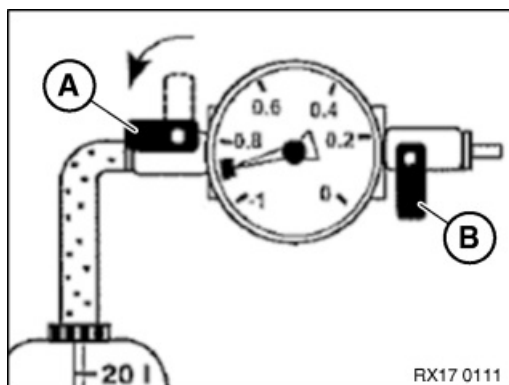


Both shutoff valves (A) and (B) must be closed. Then seal Venturi nozzle (1).





The cooling system must hold the vacuum for 30 s. If the needle in the pressure gauge drops, this indicates a leak in the cooling system.
If the vacuum remains constant, proceed with filling.
In event of leaks, check for leaks.

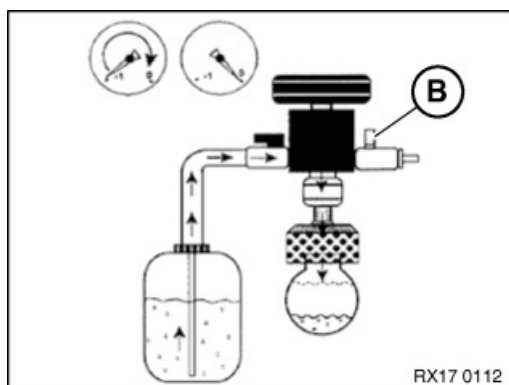


Attention!

There must be sufficient premixed coolant in the vacuum filler device collecting vessel, 1-2 litres more than the vehicle capacity.
Position the vacuum filler device container at the same height as the coolant expansion tank.

Shut-off valve (B) remains closed during the filling process.

To fill the cooling system, open shutoff valve (A) to vacuum filler device container.



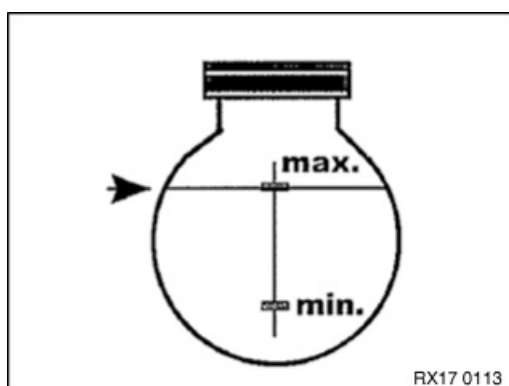
Coolant is now added.

The filling procedure is finished when the needle in the pressure gauge is at 0 bar or no longer falls.

If necessary, reduce remaining vacuum. Open shutoff valve (B) to do so.



Remove vacuum filling unit with adapter from expansion tank.



Adjust coolant level to maximum.

Close coolant expansion tank.





After the cooling system has been filled with the vacuum filling unit, another bleeding procedure must be performed for the following vehicles:

- E84 N20
- F25, F26 N52T, N55,
- F25, F26 N20
- E70, E71 N63, S63
- E70, E71 N57 D30 S 1
- E72 N63
- F20, F21, F30, F31 F35, N13
- F20, F21, F22, F23, F30, F31, F32, F33, F34, F35 F36 N20, N26
- F20, F21, F22, F23, F30, F31, F32, F33, F34, F35 F36 F87 N55
- F30 N55 Hybrid car
- F15 N55
- F15 N63 B44 O1
- F15 N57 D30 S 1
- F54, F55 , F56, F57, F60, B36, B38, B48, B46
- F80, F82, F83, S55
- F45, F46, F48, B38, B46, B48
- F25, F26, B47
- F45, F46, F48, B47, B37
- F54, F55, F56, F60, B37, B47
- F16 N63 B44 O1
- F16 N55
- F16 N57 D30 S 1
- F20, F21, F22, F23, F30, F31, F32, F33, F34, F36, B47
- F21, F20, B37
- F85, F86 S63 T 2





After the cooling system has been filled with the vacuum filling unit, another bleeding procedure must be performed for vehicles with an electric coolant pump: *Note:*

Do not open the coolant expansion tank sealing cap during the bleeding procedure.

Switch on the low-beam headlights to perform the bleeding procedure. If the low-beam headlights are not switched on, the ignition (Terminal 15) will switch off automatically after a certain period of time and interrupt the bleeding procedure.

1. Connect battery charger.
2. Switch the ignition on.
3. Switch on low-beam headlight.
4. Set heating to maximum temperature. Take back blower to smallest stage.
5. Driving experience switch must not be set to ECO PRO!
6. Press accelerator pedal for 10 seconds to floor. **Engine must not** be started.
7. The bleeding procedure was started by pressing the accelerator pedal and takes approx. 12 min. (the electrical coolant pump was activated and switches off automatically after approx. 12 min).
8. Then adjust filling level in coolant expansion tank to maximum.
9. Check cooling system for leaks.
10. If the cooling system bleeding has to be performed again, deactivate DME completely (remove ignition key for approx. 3 minutes). Then repeat from point 3.



Check function of cooling system.

Check cooling system for leaks.



**Special tools required:**

- 17 0 101
- 17 0 102
- 17 0 109
- 17 0 115

**Warning!**

Risk of burning and scalding!

Only perform this repair work after engine has cooled down.

**Important!**

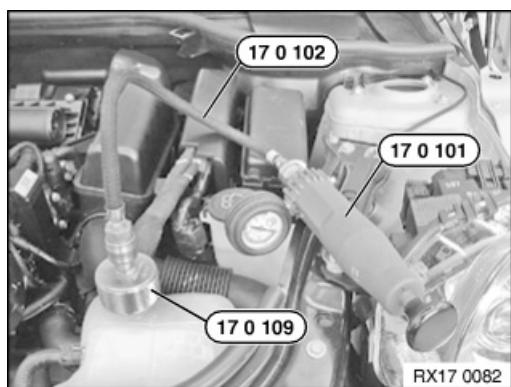
Open cooling system only when it has cooled down.

Opening the cooling system while hot can result in air entering the system.

This can cause overheating with permanent damage to the engine!

**Necessary preliminary tasks:**

Follow notes for carrying out repair work on the cooling system .

**Checking pressure drop in cooling system:**

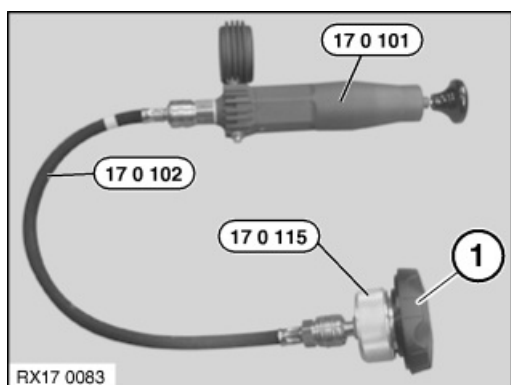
Unscrew sealing cap from coolant filler neck.

Connect special tool 17 0 109 to the coolant filler neck.

Connect special tools 17 0 102 and 17 0 101 .

Build up excess pressure and wait approx. 2 minutes.

Cooling system is tight if pressure drop does not exceed 0.1 bar.

**Checking pressure relief valve in lid:**

Connect special tool 17 0 115 to sealing cap (1).

Connect special tools 17 0 101 and 17 0 102 .

Pressurise sealing cap.

Compare opening pressure of pressure relief valve.





**Special tools required:**

- 17 2 052

**Warning!**

Risk of scalding!

Only carry out repair work on the cooling system after the engine has cooled down!

**Important!**

Wear protective gloves and safety goggles.

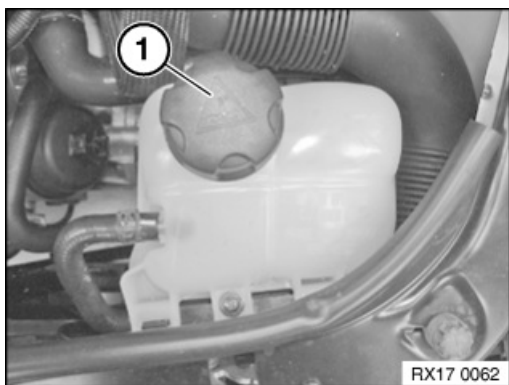
**Important!**

For contamination of the cooling system (e.g. by engine oil), the cooling system must be rinsed with water until all contamination is removed!

**Necessary preliminary tasks:**

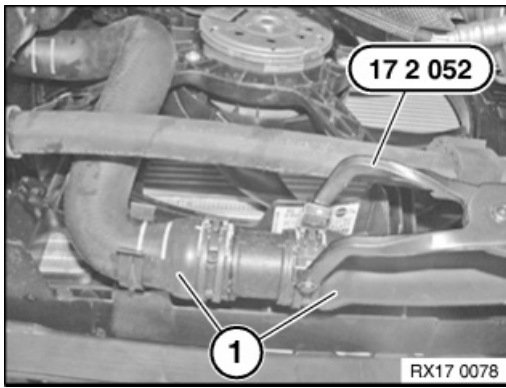
Follow notes for carrying out repair work on the cooling system .

After adding coolant, check cooling system for leak tightness.

**Draining coolant:**

Unscrew the sealing cap (1) of the coolant expansion tank.





Release spring strap on lower coolant hose (1) with special tool 17 2 052 .

Detach coolant hose (1). Drain, catch and dispose of coolant.



Adding coolant:

Observe filling capacity.

Observe mixture ratio.

Fill and bleed cooling system.

Check cooling system for leaks.



**Warning!**

Risk of burning!

Only carry out repair on the cooling system after the engine has cooled down!

**Attention!**

Wear protective gloves and safety goggles.

**Attention!****Life-time coolant filling:**

Never reuse used coolant!

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of part quantities of coolant, replace these quantities which have been drained with new coolant.

**Attention!**

Open cooling system only when it has cooled down.

Opening the cooling system while hot can result in air entering the system.

This can cause overheating with permanent damage to the engine.

**Attention!**

When carrying out repair work on the oil, coolant or fuel circuit, the alternator must be protected against dirt contamination.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

**Attention!**

Do not fill coolant expansion tank over maximum level, as overfilling will cause the coolant to overflow. This may give rise to traces of residual coolant on the expansion tank or in the engine compartment and wrongly suggest possible leaks.

**Attention!**

Make sure without fail that coolant hoses are correctly routed. Risk of damage due to sharp edges or chafing.

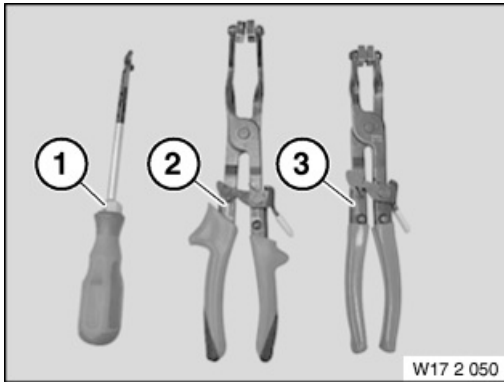




Recycling:

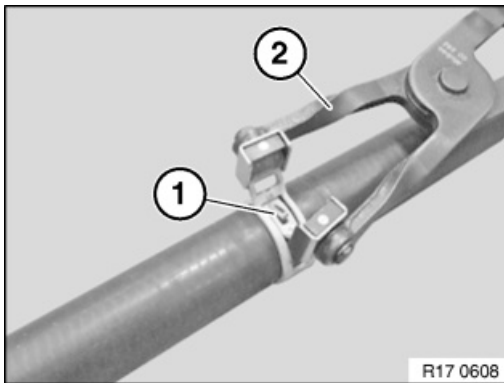
Catch and dispose of drained coolant.

Observe country-specific waste disposal regulations.

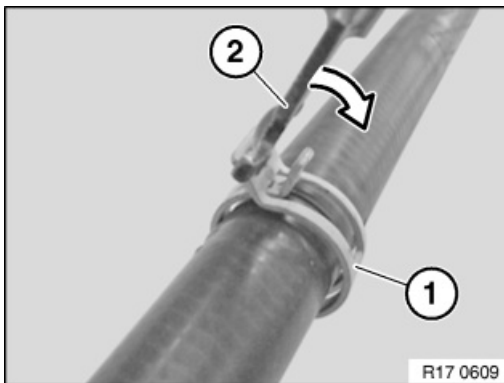


Set of special tools 17 2 050 for removing and installing the spring bracket clamps for coolant hoses.

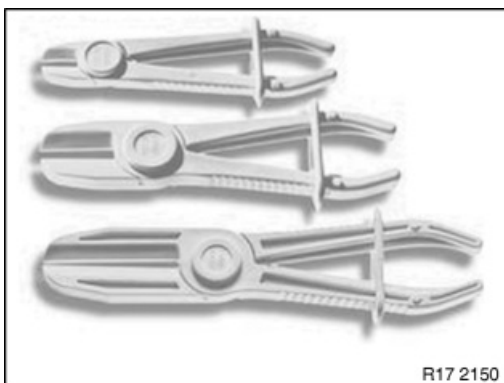
- (1) Release tool
- (2) Pliers (bent version)
- (3) Pliers (straight version)



Loosen spring strap (1) with the pliers (2).



Unlock spring strap (1) with the release tool (2).

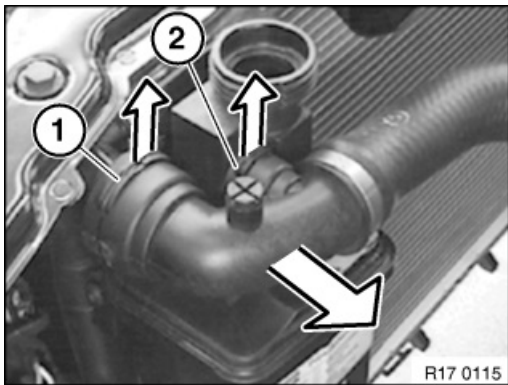


Note:

To disconnect coolant hoses, use commercially available disconnect tools such as HAZET brand tools (see table).

HAZET number:	Description
4590-1	Length of disconnect pliers (mm): 150
4590-2	Length of disconnect pliers (mm): 180
4590-3	Length of disconnect pliers (mm): 253
4590 / 2	Set of clamping pliers
4590 / 3	Set of clamping pliers

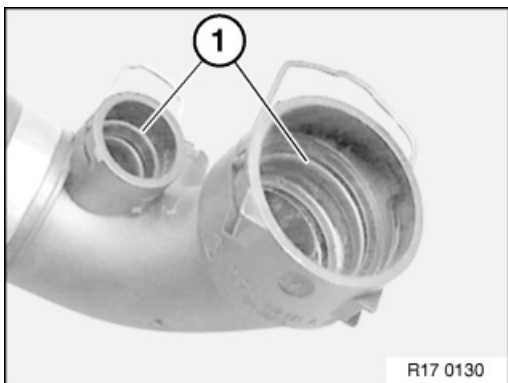




Notes on disassembly/installation of the quick-release couplings of the coolant hoses

Dismantling of quick-release coupling

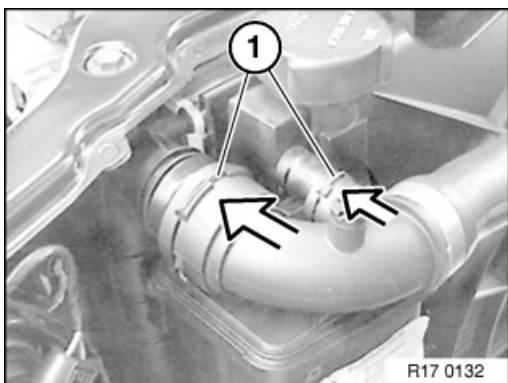
Pull out lock (1) and (2). Pull off hose.



Installation note:

Check O-rings (1).

Do not coat O-rings (1) with lubricant.



Assembly of quick-release coupling

Press in lock (1) before installing quick-release coupling.

Push on hose.

Quick-release couplings must clearly snap audibly into place.



00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



Warning!

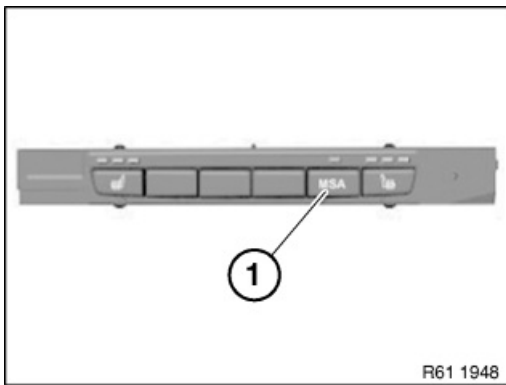
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

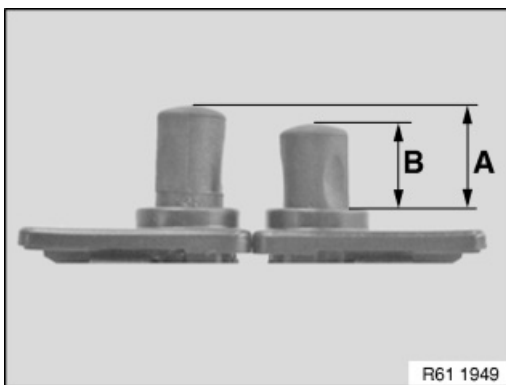
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode
A = 10 mm
 - Basic setting (engine hood/bonnet open)
B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



When working with diagnosis tools:

- Observe instructions in diagnosis tool





Note:

For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) Service Information (bulletin) 61 01 07 335
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) Service Information (bulletin) 61 01 10 629



**Warning!**

Risk of scalding! Only remove lid once engine has cooled down.



The cooling system is vented when it is topped up.
This procedure is described in Draining and topping up coolant.
Check cooling system for water leaks.

**Checking coolant level:**

Allow the engine to cool down before checking the coolant level.
Coolant temperature must not exceed 30 °C.

If the ambient temperature is above 30 °C, wait until the engine has cooled down to ambient temperature.

Top up coolant.



**Special tools required:**

- 17 0 101
- 17 0 102
- 17 0 109
- 17 0 115

**Warning!**

Risk of burning and scalding!

Only perform this repair work after engine has cooled down.

**Important!**

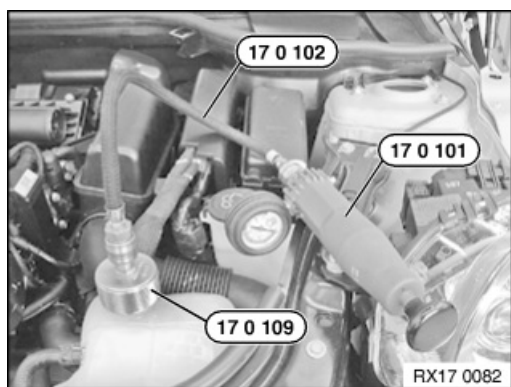
Open cooling system only when it has cooled down.

Opening the cooling system while hot can result in air entering the system.

This can cause overheating with permanent damage to the engine!

**Necessary preliminary tasks:**

Follow notes for carrying out repair work on the cooling system .

**Checking pressure drop in cooling system:**

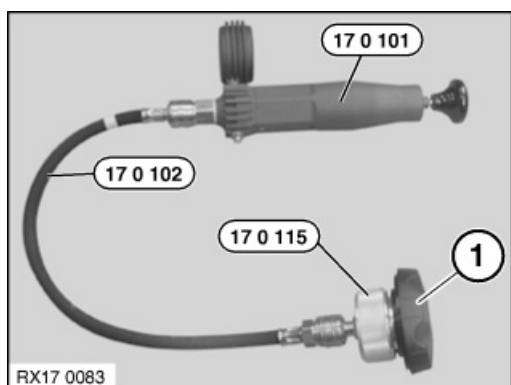
Unscrew sealing cap from coolant filler neck.

Connect special tool 17 0 109 to the coolant filler neck.

Connect special tools 17 0 102 and 17 0 101 .

Build up excess pressure and wait approx. 2 minutes.

Cooling system is tight if pressure drop does not exceed 0.1 bar.

**Checking pressure relief valve in lid:**

Connect special tool 17 0 115 to sealing cap (1).

Connect special tools 17 0 101 and 17 0 102 .

Pressurise sealing cap.

Compare opening pressure of pressure relief valve.





64 53 ... Instructions for replacement of air conditioning condensers and radiator/coolers

Attention!

Even when they are correctly installed or due to normal driving, radiators (oil cooler, radiator, charge air cooler) or air conditioning condensers may show slight impressions or deformations on their discs (1).

A slight sag with a large radius for the air conditioning condenser is also permissible.

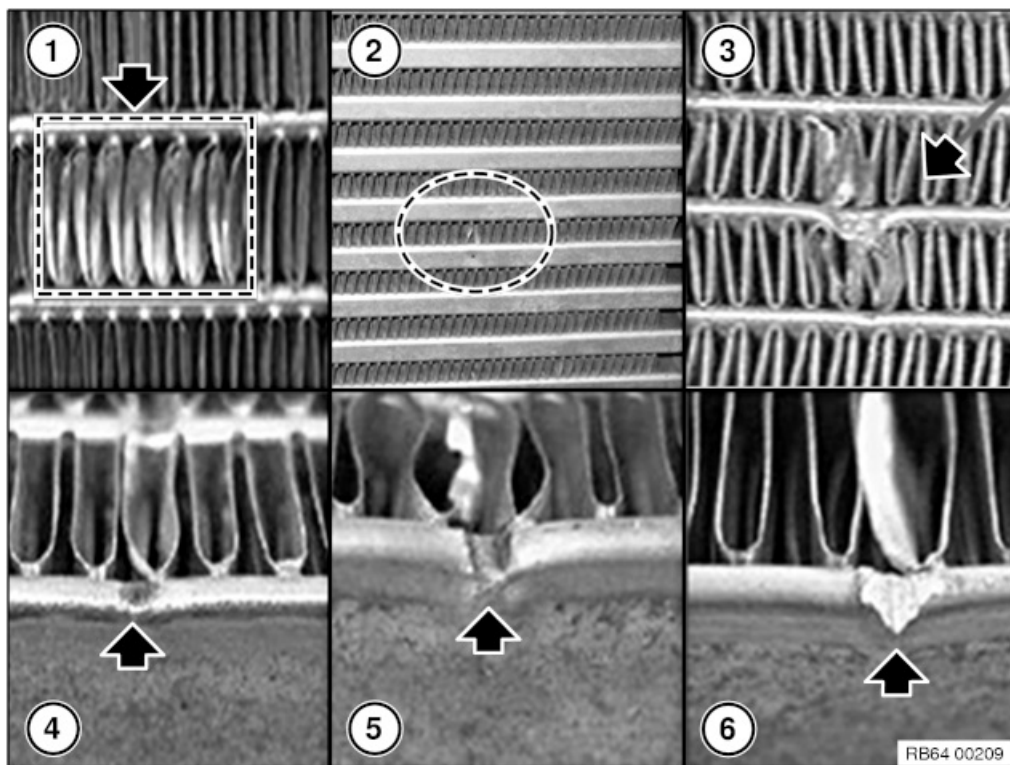
As long as tightness/function are not degraded and an adequate distance of a few mm between the radiator and air conditioning condenser remains in place, **this is not damage in either case.**

Radiators or air conditioning condensers are not to be replaced in these cases!

Note:

The deformations shown in Fig. (1) can be bent back with a standard fin comb..

Damage to lines carrying media or on the flat pipe require exchange of the radiator or air conditioning condenser (2-6).



Dryer flask (integrated in the air conditioning condenser):

Round dents/depressions are permitted.

The air conditioning condenser is not to be replaced in this case.



64 53 ... Instructions for replacement of air conditioning condensers and radiator/coolers

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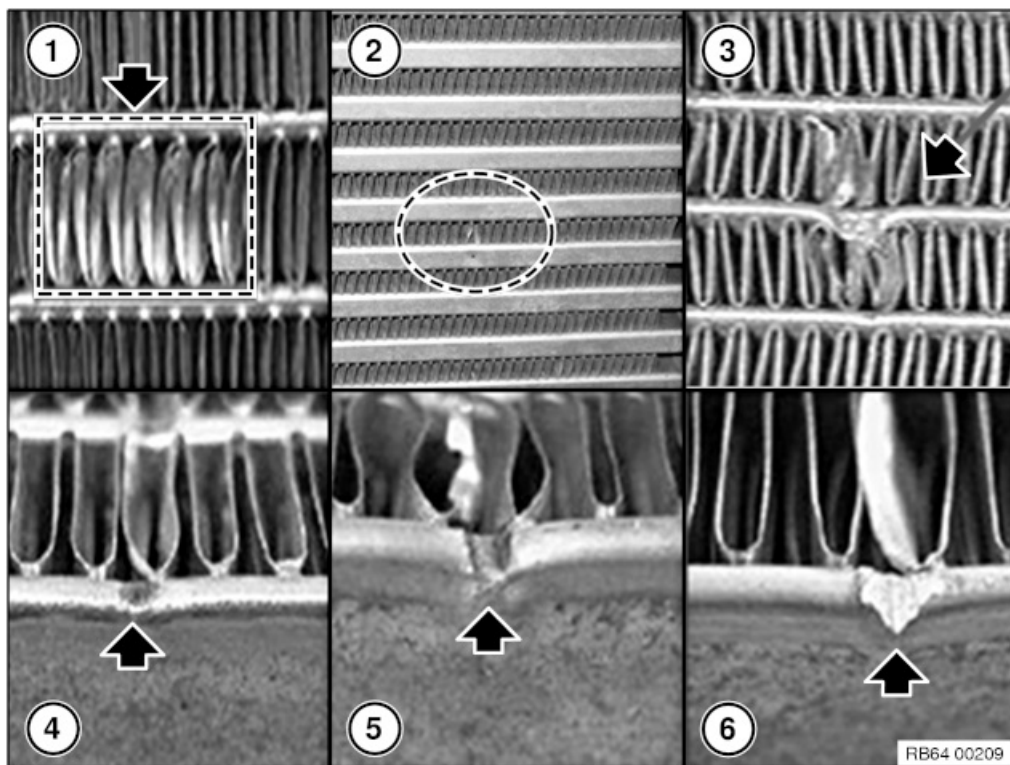
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Dryer flask (integrated in the air conditioning condenser):

Round dents/depressions are permitted.

The air conditioning condenser is not to be replaced in this case.



17 11 100 Removing and installing or replacing the coolant expansion tank (N12, N14, N16, N18)



Special tools required:

- 17 2 052



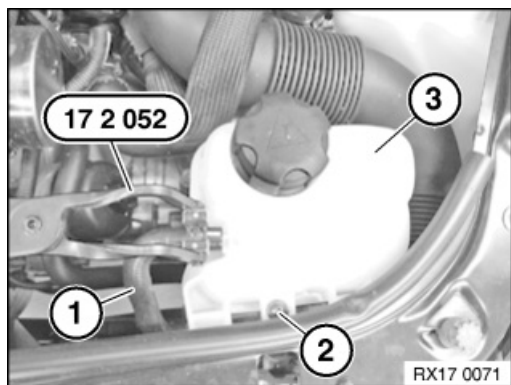
Note:

Follow notes for carrying out repair work on the cooling system!



Important!

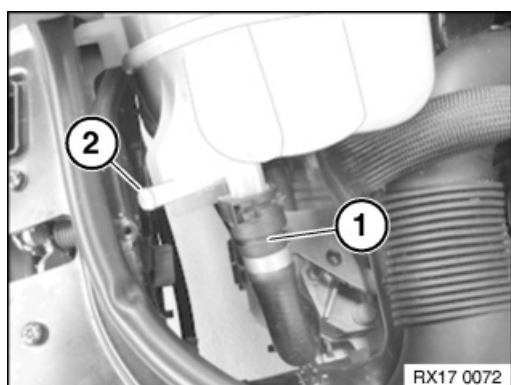
Make sure without fail that coolant hoses are correctly routed. Risk of damage due to sharp edges or chafing.



Loosen the spring strap for the hose (1) with special tool 17 2 052 and pull the hose (1) off.

Release screw (2).

Release expansion tank (3) from rubber mount and raise slightly until lower coolant hose is accessible.



Unlock and detach lower coolant hose (1). Catch and dispose of escaping coolant.

Remove expansion tank.

Installation note:

Make sure the bearing journal (2) is installed in the correct installation position in the rubber mount.



Note:

Check coolant level



**Special tools required:**

- 17 2 051
- 17 2 052

**Warning!**

Risk of scalding!

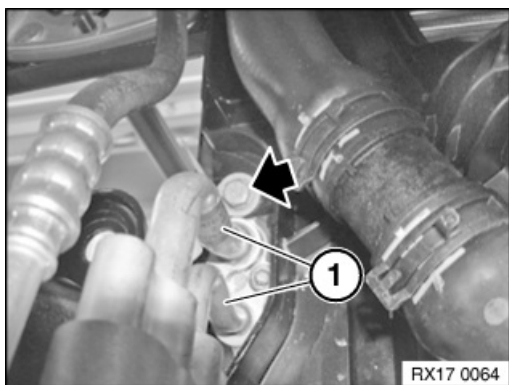
Only perform this repair work after engine has cooled down!

**Necessary preliminary tasks:**

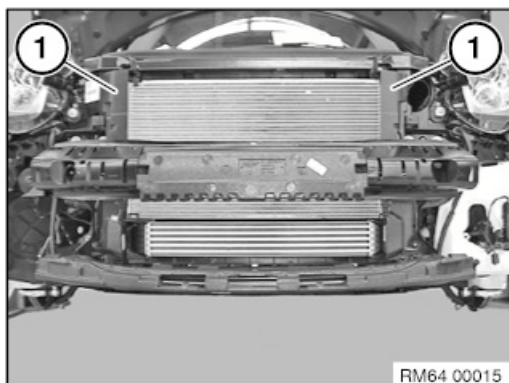
- Follow instructions for repair work on the cooling system.
- Drain coolant.
- Remove front bumper panel.
- Loosen but do not remove the coolant expansion tank.

**Important!**

Make sure without fail that coolant hoses are correctly routed, risk of damage by sharp edges or abrasion.

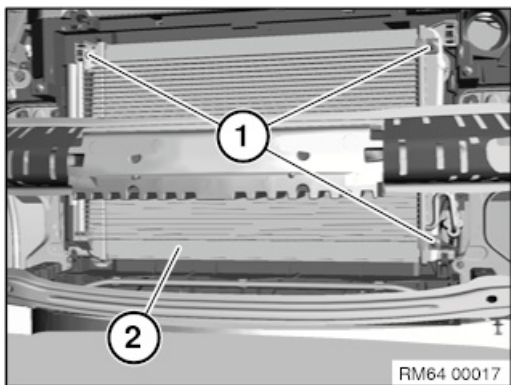


Release the mounting bolts of the refrigerant lines (1) on the front panel.



Remove air ducts (1) on the left and right.





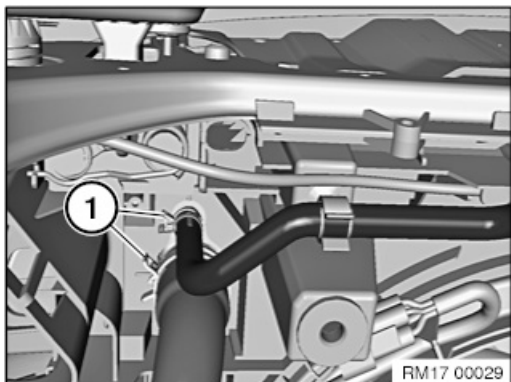
Release screws (1).

Pull condenser (2) forward. Do **not** remove the condenser or loosen the refrigerant lines.

Important!

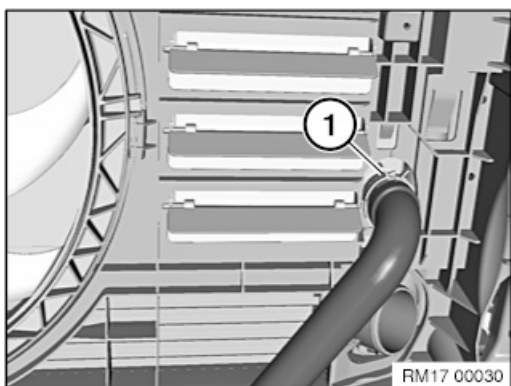
Secure condenser without fail against falling out and against bending of lines.

Bent lines can cause leaks!

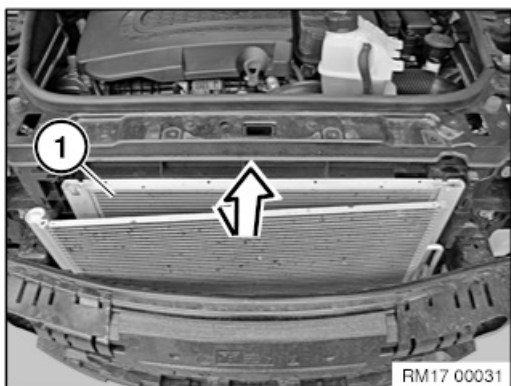


Unlock and pull off top coolant hoses (1) at radiator .

Release the spring straps of coolant hoses (1) with special tool 17 2 052 and detach.



Release the spring straps from the lower coolant hose (1) using special tool 17 2 051 .



Pull the radiator (1) forward slightly and lift up to remove.

When removing the cooler, make sure that the condenser is not damaged!



Reassemble the vehicle.

Check cooling system for leaks.



17 11 035
N18)

Removing and installing/replacing fan cowl with electric fan (N14,



Warning!

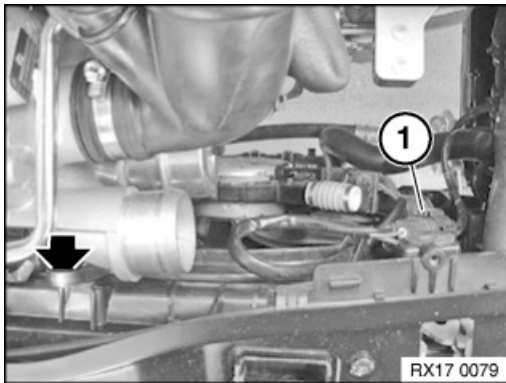
Risk of burning!

Only perform this repair work after engine has cooled down.



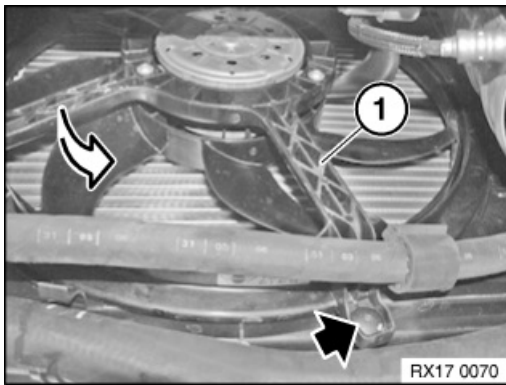
Necessary preliminary work:

Remove left charge air duct.



Release screw.

Unlock connector (1) and remove.



Release screw.

Unlock fan cowl (1) in direction of arrow, feed out in downward direction and remove.



64 53 ... Instructions for replacement of air conditioning condensers and radiator/coolers

Attention!

Even when they are correctly installed or due to normal driving, radiators (oil cooler, radiator, charge air cooler) or air conditioning condensers may show slight impressions or deformations on their discs (1).

A slight sag with a large radius for the air conditioning condenser is also permissible.

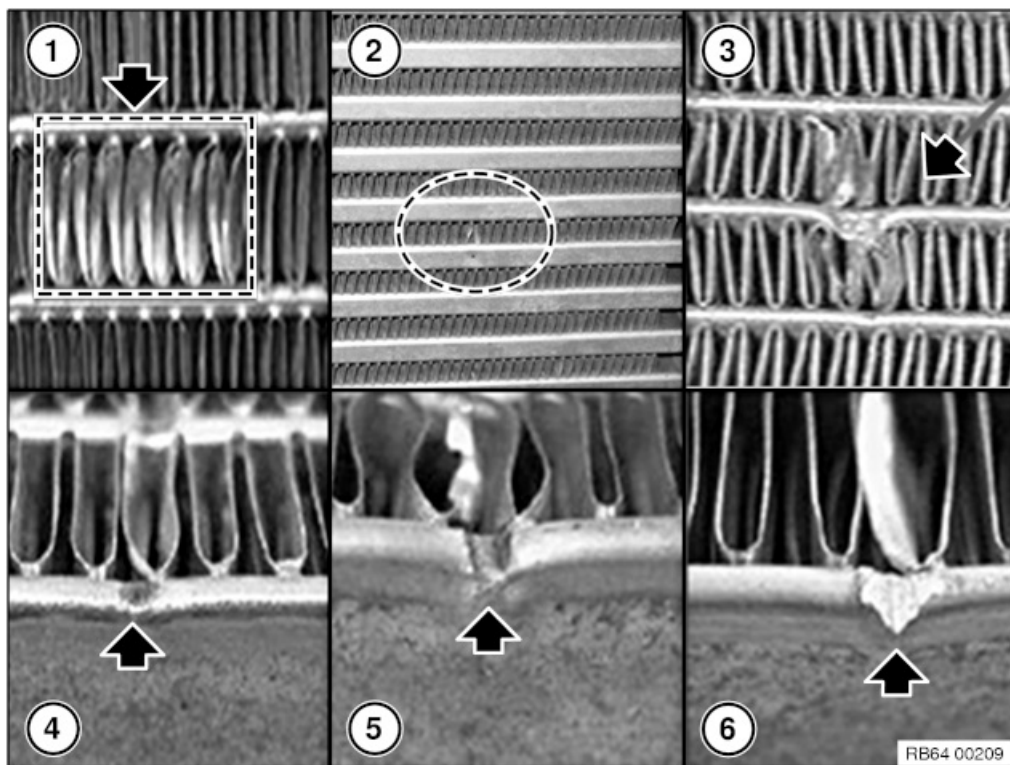
As long as tightness/function are not degraded and an adequate distance of a few mm between the radiator and air conditioning condenser remains in place, **this is not damage in either case.**

Radiators or air conditioning condensers are not to be replaced in these cases!

Note:

The deformations shown in Fig. (1) can be bent back with a standard fin comb..

Damage to lines carrying media or on the flat pipe require exchange of the radiator or air conditioning condenser (2-6).



Dryer flask (integrated in the air conditioning condenser):

Round dents/depressions are permitted.

The air conditioning condenser is not to be replaced in this case.



64 53 ... Instructions for replacement of air conditioning condensers and radiator/coolers

Attention!

Even when they are correctly installed or due to normal driving, radiators (oil cooler, radiator, charge air cooler) or air conditioning condensers may show slight impressions or deformations on their discs (1).

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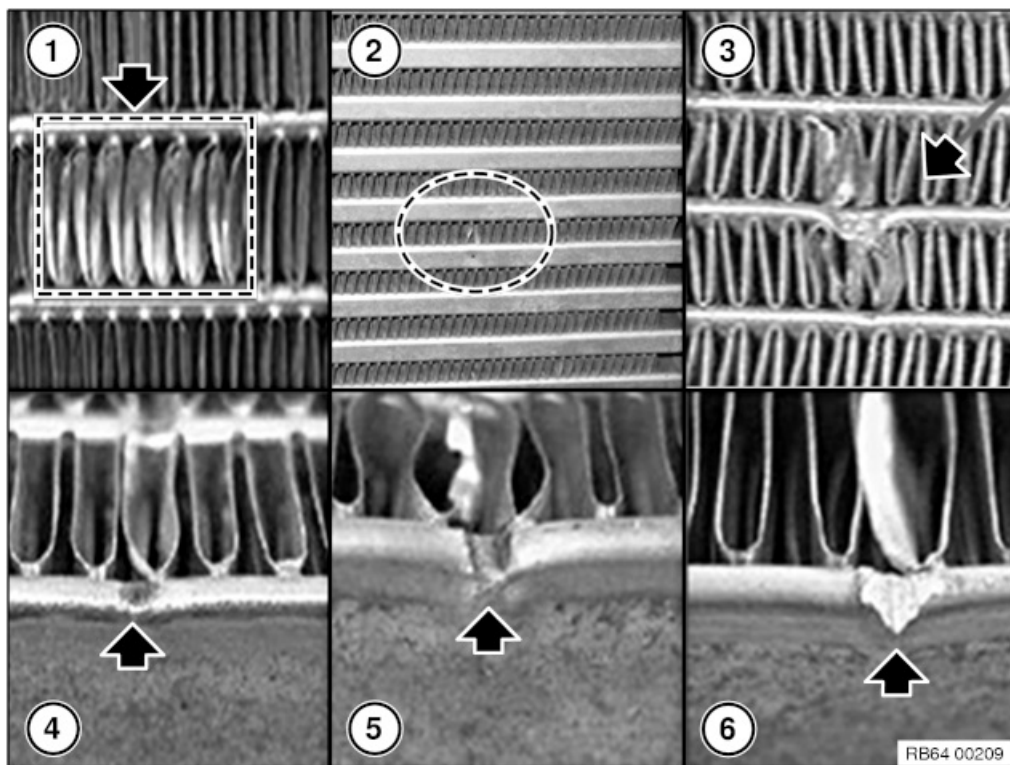
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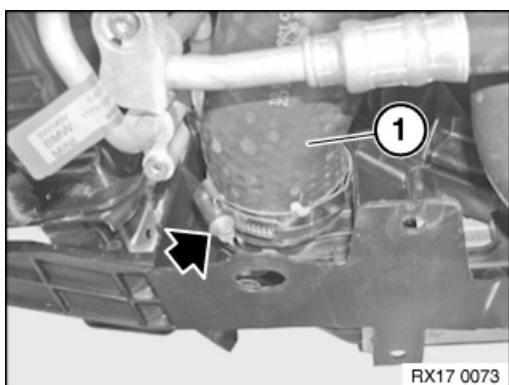
**Important!**

If the charge air hoses are not fitted without grease and dry, this will result in exhaust turbocharger failure.

Fit charge air hoses dry and without grease.

**Necessary preliminary work:**

Remove bumper trim.



Unfasten clamp.

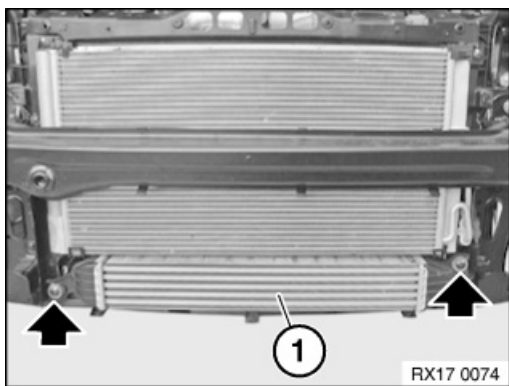
Detach left charge air hose (1) from charge air cooler.

Important!

Fit charge air hoses dry and without grease.

Note:

Illustration shows and text refers to the left side. The procedure is identical for the right intake duct.



Release screws.

Remove charge air cooler (1).



**Warning!**

Risk of burning!

Only carry out repair on the cooling system after the engine has cooled down!

**Attention!**

Wear protective gloves and safety goggles.

**Attention!****Life-time coolant filling:**

Never reuse used coolant!

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of part quantities of coolant, replace these quantities which have been drained with new coolant.

**Attention!**

Open cooling system only when it has cooled down.

Opening the cooling system while hot can result in air entering the system.

This can cause overheating with permanent damage to the engine.

**Attention!**

When carrying out repair work on the oil, coolant or fuel circuit, the alternator must be protected against dirt contamination.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

**Attention!**

Do not fill coolant expansion tank over maximum level, as overfilling will cause the coolant to overflow. This may give rise to traces of residual coolant on the expansion tank or in the engine compartment and wrongly suggest possible leaks.

**Attention!**

Make sure without fail that coolant hoses are correctly routed. Risk of damage due to sharp edges or chafing.

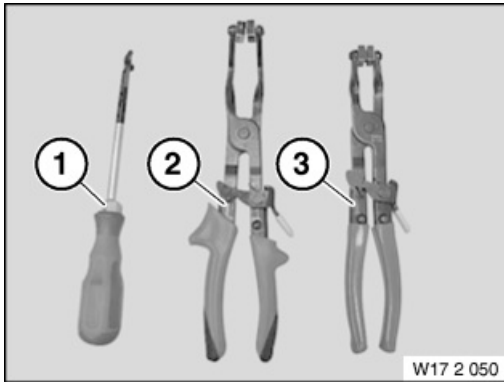




Recycling:

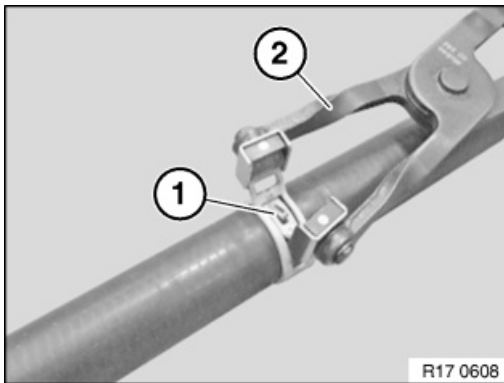
Catch and dispose of drained coolant.

Observe country-specific waste disposal regulations.

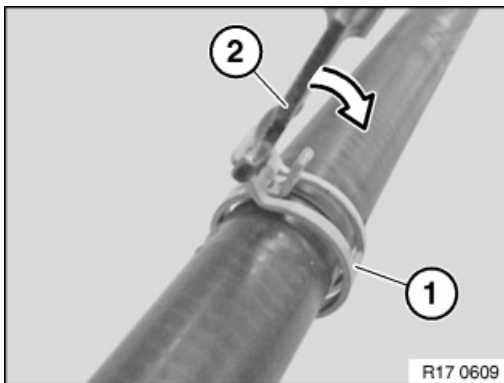


Set of special tools 17 2 050 for removing and installing the spring bracket clamps for coolant hoses.

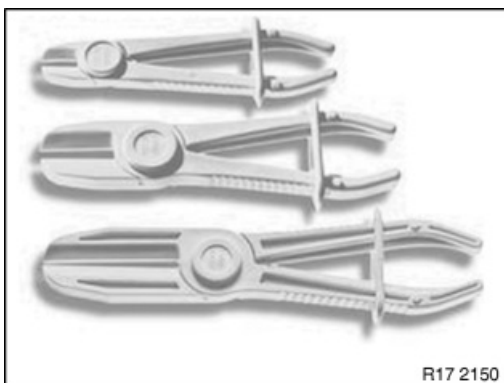
- (1) Release tool
- (2) Pliers (bent version)
- (3) Pliers (straight version)



Loosen spring strap (1) with the pliers (2).



Unlock spring strap (1) with the release tool (2).

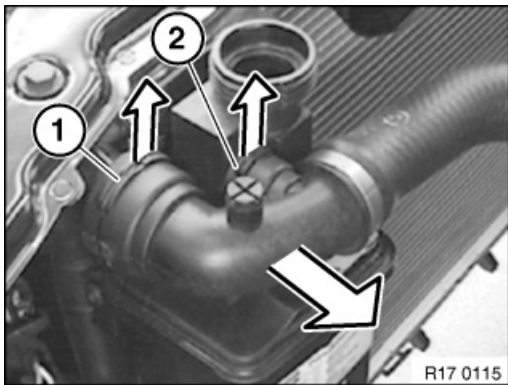


Note:

To disconnect coolant hoses, use commercially available disconnect tools such as HAZET brand tools (see table).

HAZET number:	Description
4590-1	Length of disconnect pliers (mm): 150
4590-2	Length of disconnect pliers (mm): 180
4590-3	Length of disconnect pliers (mm): 253
4590 / 2	Set of clamping pliers
4590 / 3	Set of clamping pliers

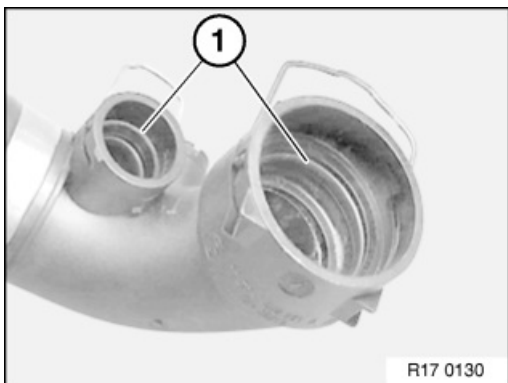




Notes on disassembly/installation of the quick-release couplings of the coolant hoses

Dismantling of quick-release coupling

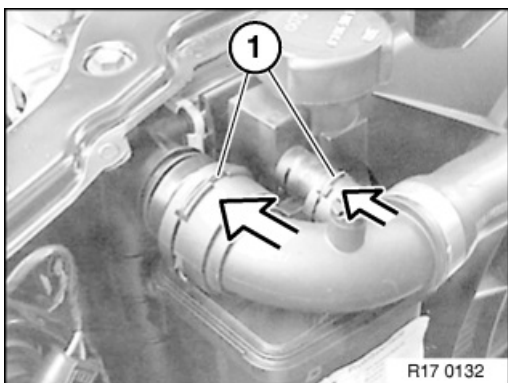
Pull out lock (1) and (2). Pull off hose.



Installation note:

Check O-rings (1).

Do not coat O-rings (1) with lubricant.



Assembly of quick-release coupling

Press in lock (1) before installing quick-release coupling.

Push on hose.

Quick-release couplings must clearly snap audibly into place.

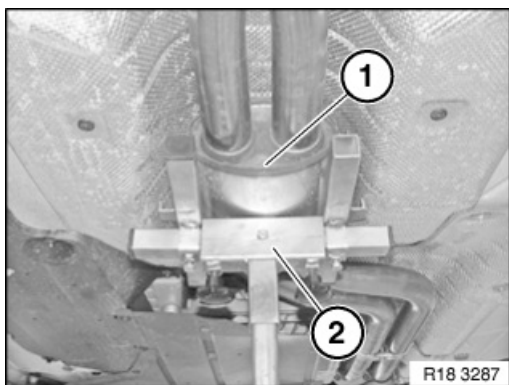


**Warning!**

Danger of burning and other injuries!

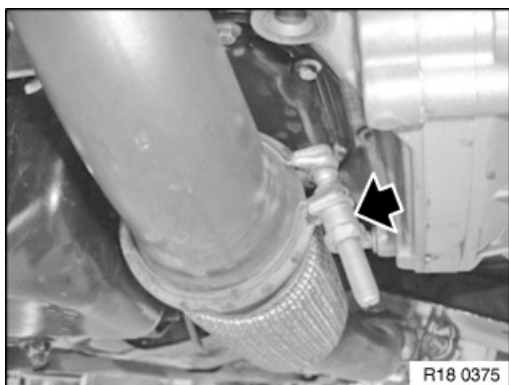
This repair work may only be carried out on an exhaust system which has cooled down.

Removal of the exhaust system must be carried out with the assistance of a second person.



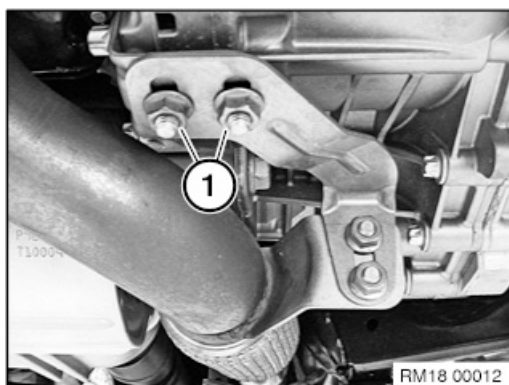
Support exhaust system (1) with a suitable jack (2).

Secure exhaust system against falling off.



Unfasten clamp.

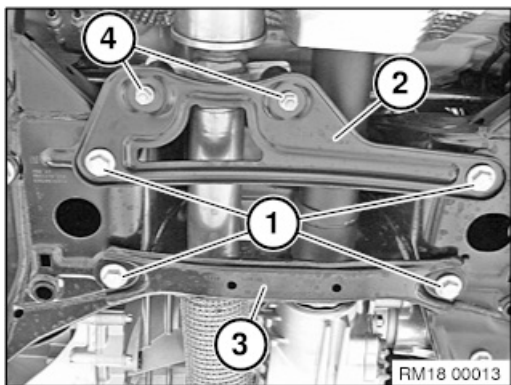
Tightening torque 18 31 5AZ.



Unscrew nuts (1).

Tightening torque 18 31 7AZ.





Release screws (1).

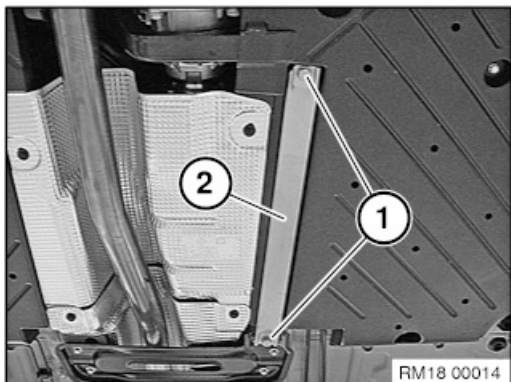
Tightening torque 18 31 9AZ.

Remove reinforcement plate (2) and reinforcement strut (3).

Note:

Loosen nuts (4) only if replacing exhaust system.

Tightening torque 18 31 8AZ.

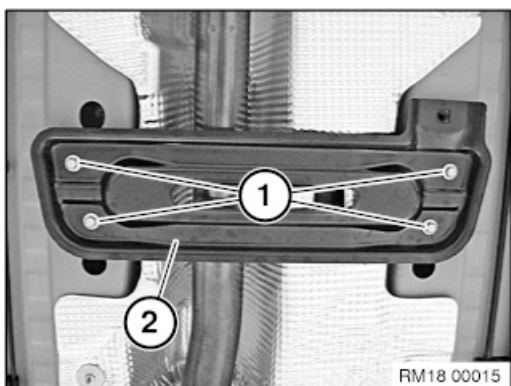


Vehicles with four-wheel drive only:

Release screws (1).

Tightening torque 33 31 4AZ.

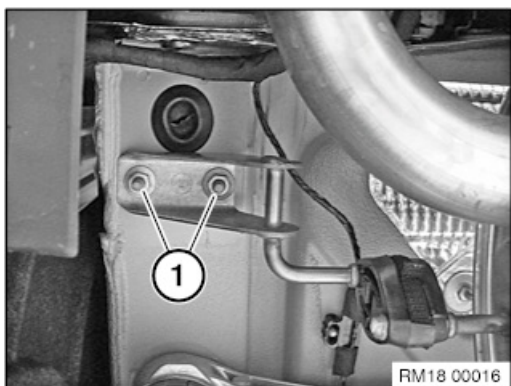
Remove stiffening strut(2).



Release screws (1).

Tightening torque 18 31 10AZ.

Remove reinforcement plate (2).



Unscrew nuts (1).

Tightening torque 18 31 11AZ.

N18 only:

Release nuts (1) on rear silencer on left and right.

Tightening torque 18 31 11AZ.

Lower and remove exhaust system with assistance of a second person.



Note:

Check rubber mount for damage. Replaced damaged rubber mounts.





Warning!

Risk of burning!

This repair work may only be carried out on an exhaust system which has cooled down.



Necessary preliminary work:

- Move front panel into working position.

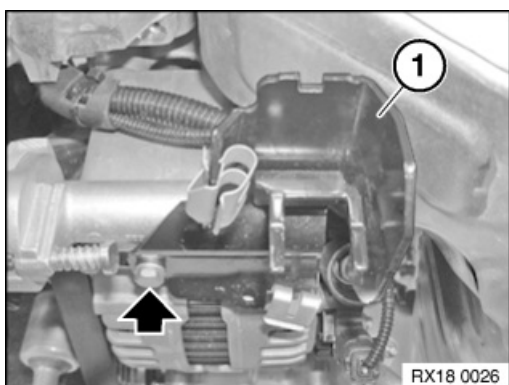


Note:

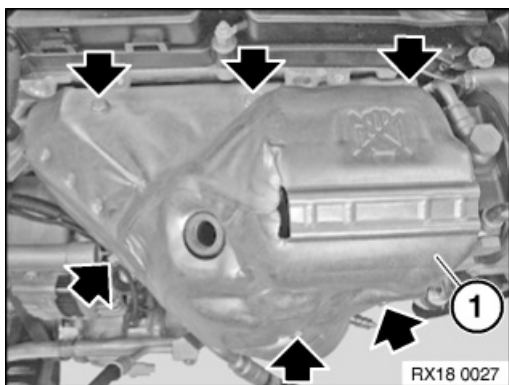
The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove the control sensor .

Remove monitoring sensor .



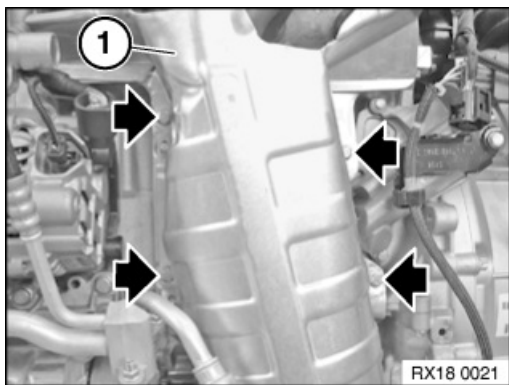
Release screw and remove holder (1).



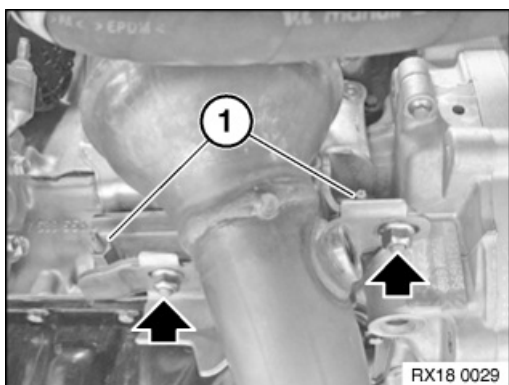
Release screws and remove upper heat shield (1).

Tightening torque 11 65 7AZ.





Release screws and remove lower heat shield (1).
Tightening torque 11 65 7AZ.



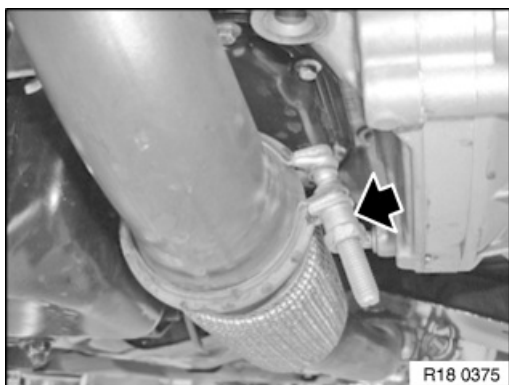
Loosen nuts.

Installation note:
Replace nuts.

Tightening torque 18 31 3AZ.

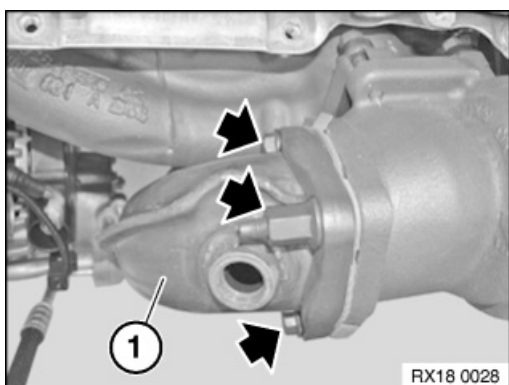
Unscrew nuts (1).

Tightening torque 18 31 4AZ.



Unfasten clamp.

Tightening torque 18 31 5AZ.



Loosen screws and nut.

Feed out catalytic converter (1) and remove.

Installation note:

- Renew gasket.
- Clean sealing surfaces.
- Apply a thin coating of copper paste to bolt thread.
- Tightening torque 18 31 1AZ.





Special tools required:

- 17 2 051



Warning!

Risk of burning!

This repair work may only be carried out on an exhaust system which has cooled down.



Important!

Gaiter and charge air hoses with clamp fastenings must be installed dry and free from grease!

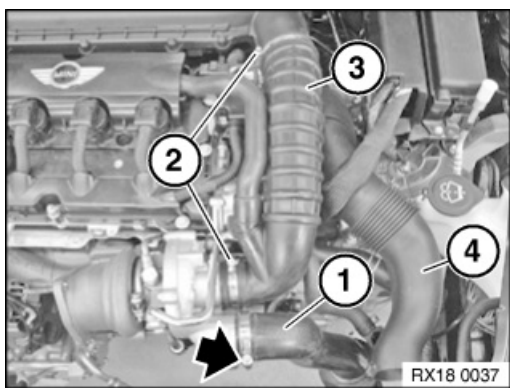
Sealing surfaces and connecting branches must be dry and free from grease.

If gaiter and charge air hoses with clamp fastenings are not installed dry and free from grease, this may result in exhaust turbocharger failure!



Necessary preliminary tasks:

- Drain coolant.
- Remove coolant expansion tank.
- Remove the catalytic converter.



Release the clamp and detach the charge air duct (1).

Release clamps (2) and pull off gaiter (3).

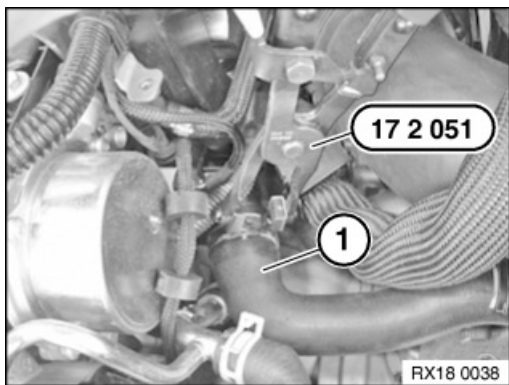
Remove intake pipe (4).

Installation note:

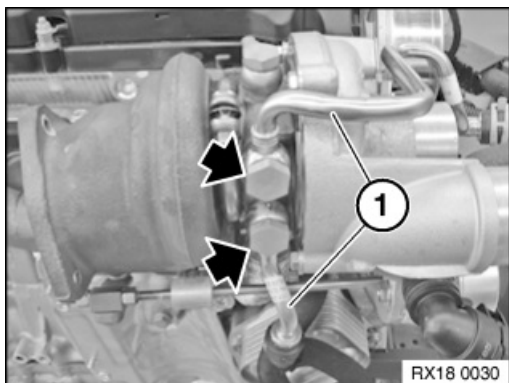
Install gaiter (3) and charge-air duct (1) dry and free from grease.

Connecting branch on exhaust turbocharger must be dry and free from grease.





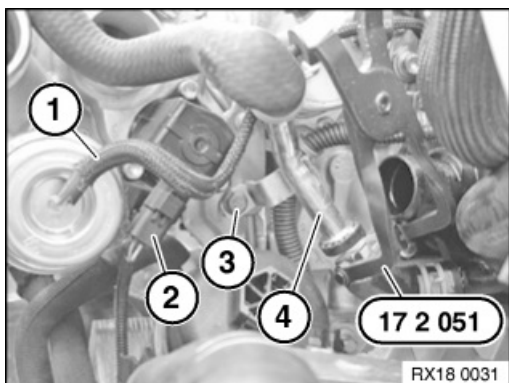
Release the spring strap using special tool 17 2 051 and pull off the coolant hose (1).



Release screws and detach lines (1). *Installation note:*
Replace gaskets.

Tightening torque N1411 65 8AZ .

Tightening torque N1811 65 9AZ.

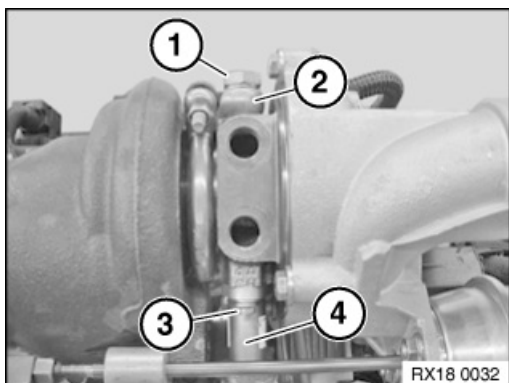


Pull off hose (1).

Unlock connector (2) and remove.

Release screw (3).

Release spring strap with special tool 17 2 051 . Pull off line (4) and remove.



Release screw (1) and detach line (2).

Installation note:
Replace gaskets.

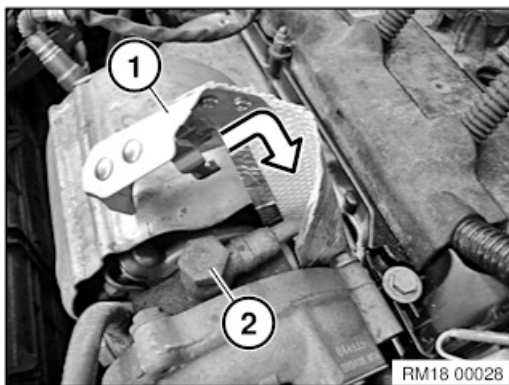
Tightening torque: 11 65 4AZ.

Release screw (3) and detach line (4).

Installation note:
Replace sealing ring.

Tightening torque 11 65 5AZ.





Installation note:

When fitting engine oil pipe and banjo bolt, install thermal protection (1) (see Electronic Parts Catalogue).

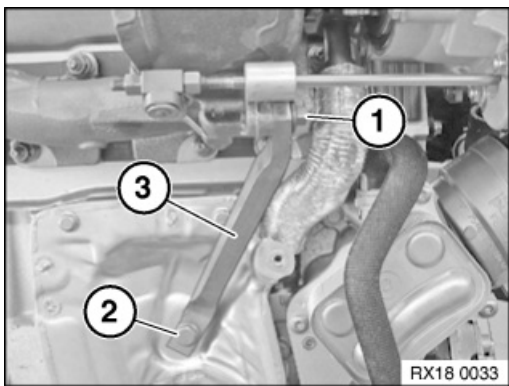
Wrap thermal protection around engine oil pipe.

Check banjo bolt (2) and engine oil pipe for blockage. Replace blocked banjo bolt and engine oil pipe.



Installation note:

Make sure that thermal protection clamp (1) engages correctly.

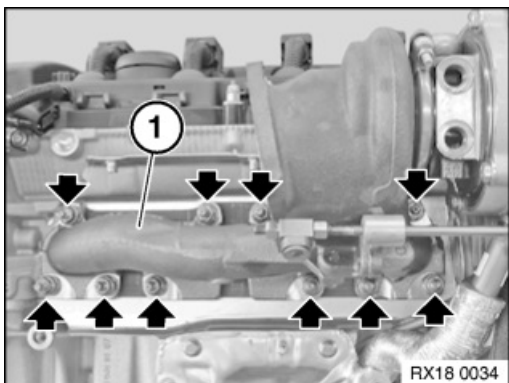


Release screw (1).

Tightening torque 11 65 3AZ .

Release screw (2) and remove holder (3).

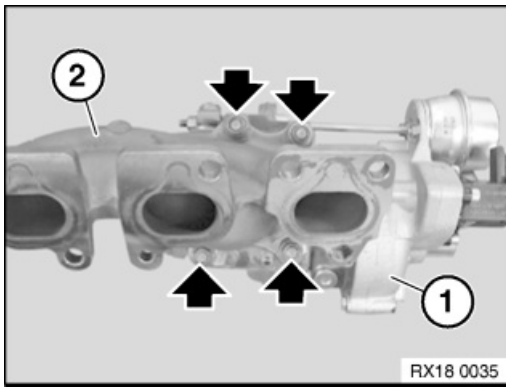
Tightening torque 11 65 6AZ .



Release nuts and remove exhaust manifold (1). *Installation note:*

- Replace gasket and nuts.
- Clean sealing surfaces.
- Apply a thin coat of copper paste to thread.
- Tightening torque 18 40 1AZ .





Release nuts and remove exhaust turbocharger (1) from exhaust manifold (2).

Observe important information during removal or replacement of the exhaust turbocharger!

Installation note:

- Replace gasket and nuts.
- Clean sealing surfaces.
- Apply a thin coat of copper paste to thread.
- Tightening torque 11 65 1AZ .



Note:

Assemble engine.

Top up coolant.

Check engine oil level.

Clear DME fault memory.



18 12 031 Replacing front silencer (N18)



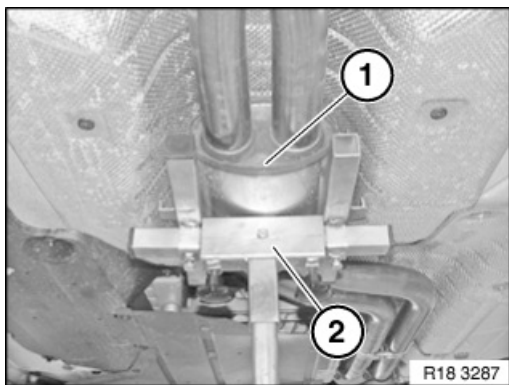
Warning!

Risk of burning!

Only perform this repair work after engine has cooled down.

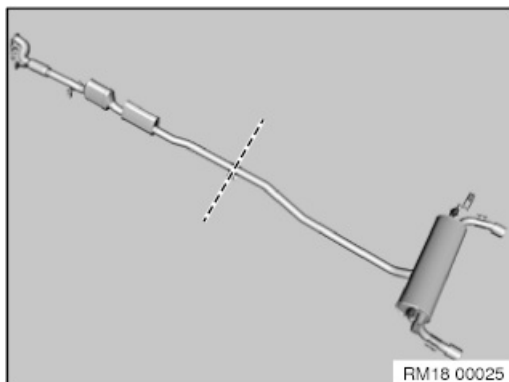
Danger of injury!

Removal of the exhaust system must be carried out with the assistance of a second person.



Support exhaust system (1) with a suitable jack (2).

Protect the front and rear silencers from falling down.



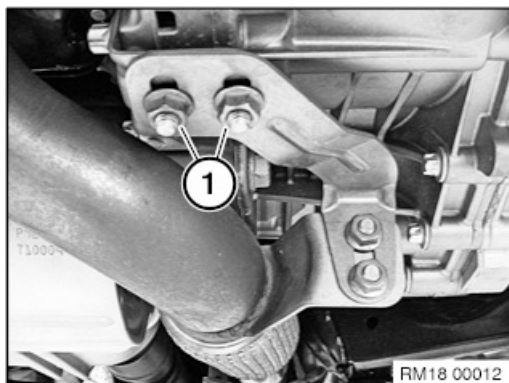
Note:

If the separation point is not marked by a punch mark in the pipe, determine the separation point by means of the pipe length on the new front silencer.

Carry over separation point to faulty front silencer and mark.

Secure front silencer against falling out.

Cut through exhaust pipes at marked point with a suitable tool.



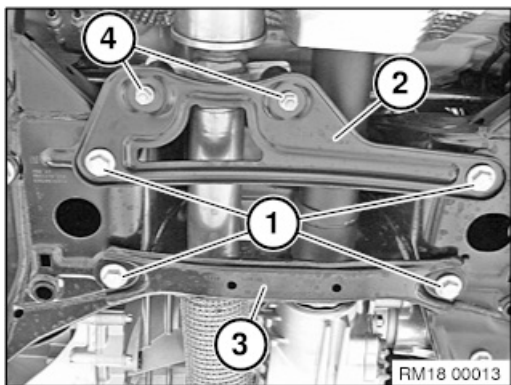
Unscrew nuts (1).

Tightening torque 18 31 7AZ.

Installation note:

Fit the holder to the new front silencer.





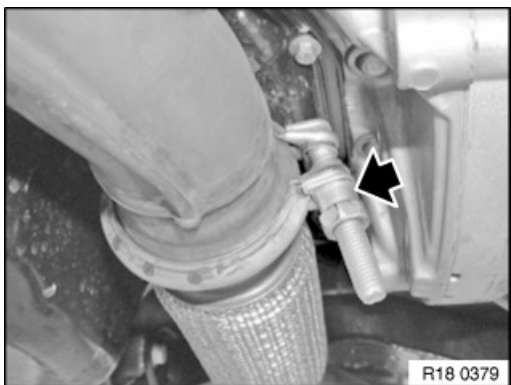
Release screws (1).

Tightening torque 18 31 9AZ.

Unscrew nuts (4).

Tightening torque 18 31 8AZ.

Remove reinforcement plate (2) and reinforcement strut (3).



Unfasten clamp.

Tightening torque 18 31 5AZ.

Lower front silencer and remove.



Installation note:

Fit front silencer and connect with clamp.

Centre clamp and tighten down.

Tightening torque 18 31 6AZ.



Installation note:

Check rubber mount for damage.

If necessary, replace damaged rubber mounts.

Check exhaust system for leak tightness.



18 12 031 Replacing rear silencer (N18)



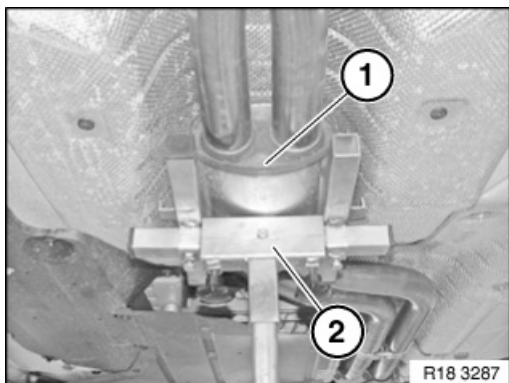
Warning!

Risk of burning!

Only perform this repair work after engine has cooled down.

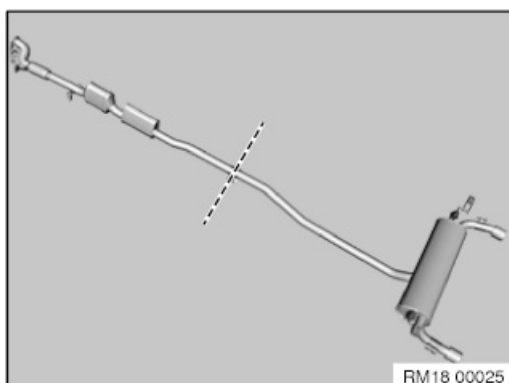
Danger of injury!

Removal of the exhaust system must be carried out with the assistance of a second person.



Support exhaust system (1) with a suitable jack (2).

Protect the front and rear silencers from falling down.



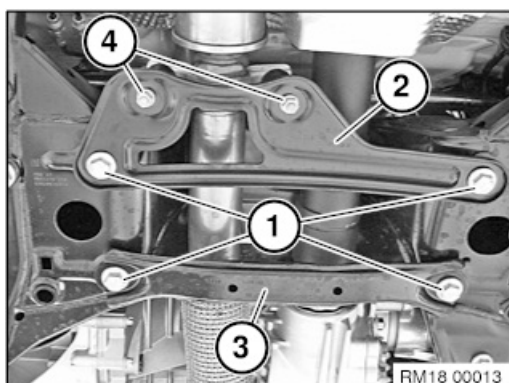
Note:

If the separation point line is not marked by a punch mark in the pipe, determine the separation point by means of the pipe length on the new rear silencer.

Carry over separation point to faulty rear silencer and mark.

Secure rear silencer against falling off.

Cut through exhaust pipes at marked point with a suitable tool.



Release screws (1).

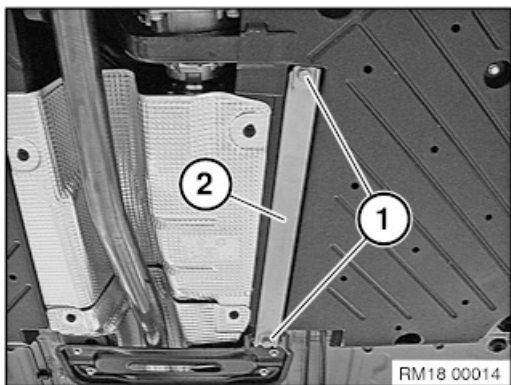
Tightening torque 18 31 9AZ.

Unscrew nuts (4).

Tightening torque 18 31 8AZ.

Remove reinforcement plate (2) and reinforcement strut (3).



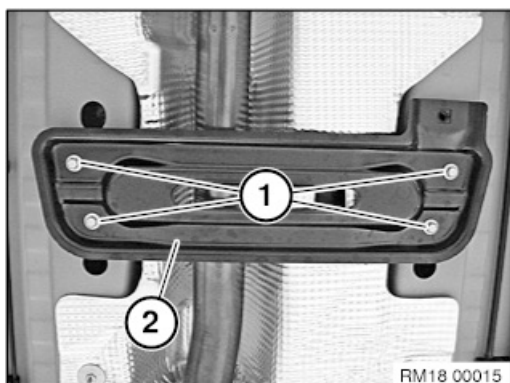


Vehicles with four-wheel drive only:

Release screws (1).

Tightening torque 33 31 4AZ.

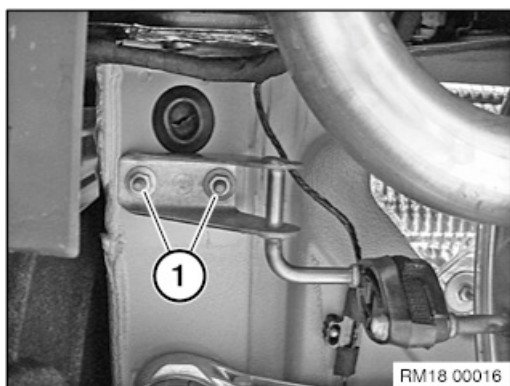
Remove stiffening strut(2).



Release screws (1).

Tightening torque 18 31 10AZ.

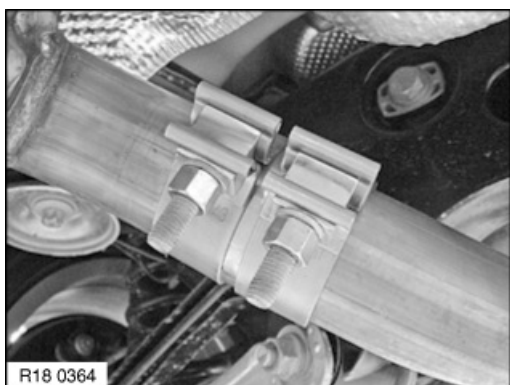
Remove reinforcement plate (2).



Release nuts (1) on rear silencer on left and right.

Tightening torque 18 31 11AZ.

Lower and remove rear silencer.



Installation note:

Adapt new rear silencer and connect using clamp.

Centre clamp and tighten down.

Tightening torque 18 31 6AZ.



Installation note:

Check rubber mount for damage.

If necessary, replace damaged rubber mounts.

Check exhaust system for leak tightness.





**Prerequisite:**

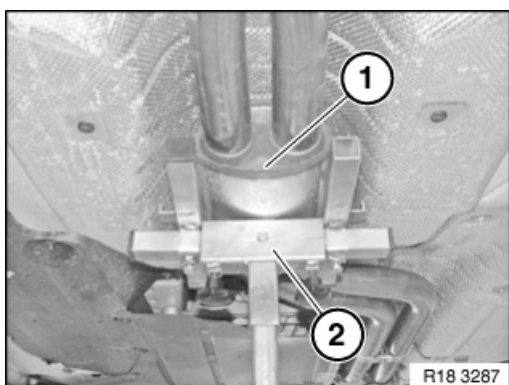
To carry out this repair work, the mechatronics technician must be trained in the use of welders.

Additionally required:

- MAG (metal active gas) welder
- **Stainless steel welding wire** (European material number 1.4370)
- (Wire cannot be obtained through the BMW dealer organisation!)
- Mixed gas (82 % argon, 18 % carbon dioxide)

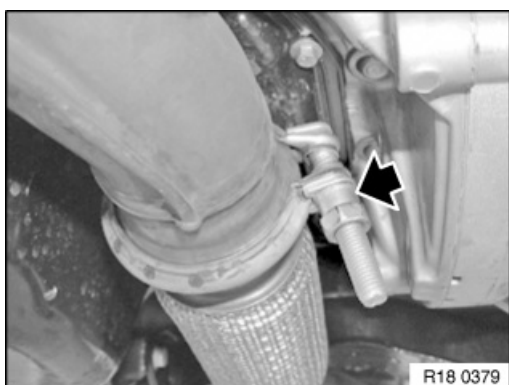
**Warning!****Risk of burning!**

Only perform this repair work on an engine that has cooled down.



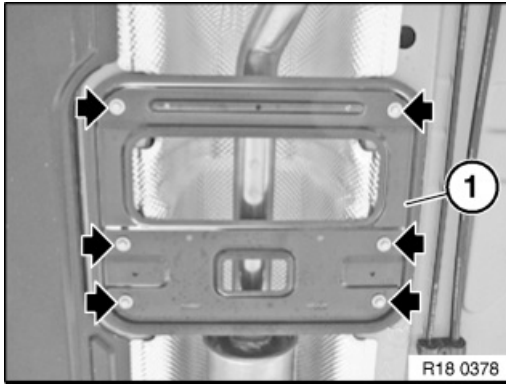
Support exhaust system (1) with a suitable jack (2).

Secure exhaust system against falling off.



Unfasten clamp.





Support exhaust system with a suitable jack.

Release screws and remove transverse reinforcement (1).

Lower exhaust system.



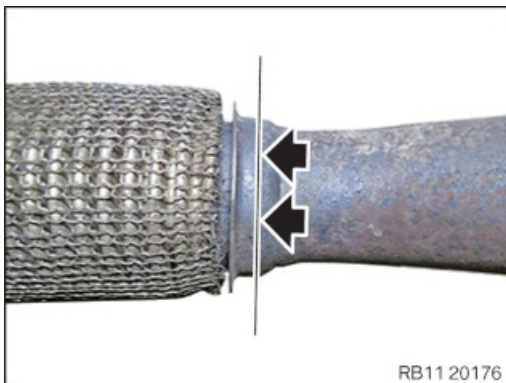
Attention!

Exclusively separate the outer shell.

Do not completely cut through flexible tube; inner pipe must remain intact.

Ensure that the cut line and the edge of the flexible tube are parallel.

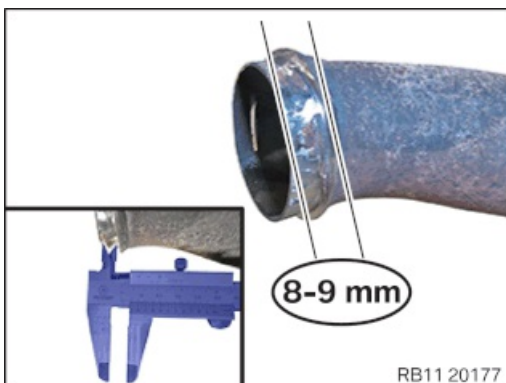
Perform process in the same way at other end of flexible tube.



Cut all around the mark along the weld seam by 2 to 3 mm (see arrow).

Cut uniformly all around until the flexible tube can be disconnected from the weld seam using a suitable tool.

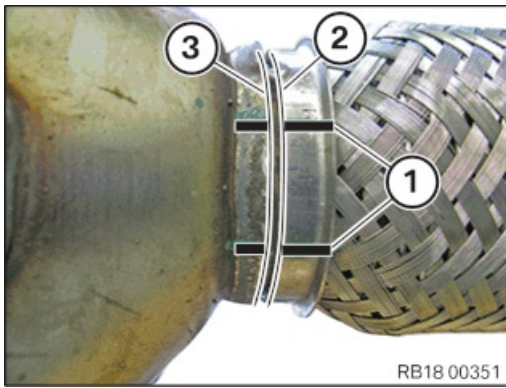
The inner pipe must stay on the weld seam.



Note:

The inner pipe must remain intact 8-9 mm on the exhaust pipe.





Connect a new flexible tube to the inner pipe and align it.

Note:

Make sure that flexible tube (2) is parallel to cutting edge (3).

Observe distance of approx. 1-2 mm between flexible tube (2) and weld seam (3).

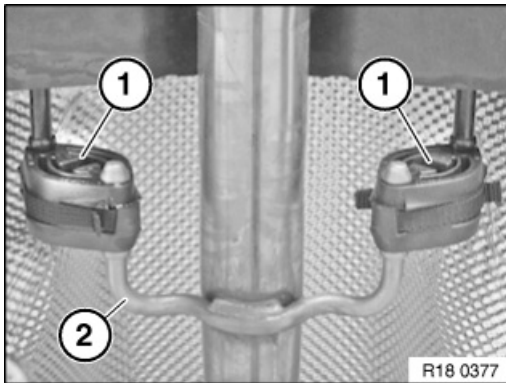
Weld flexible tube (1) all around on both sides.

Use stainless steel welding wire.

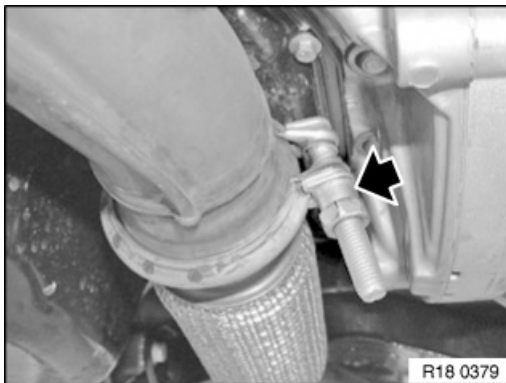
Graphic: N47.



Required follow-up work:

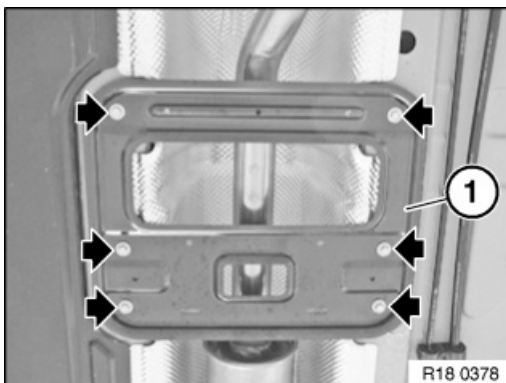


Attach rubber mount (1) of exhaust bracket (2).



Install a new clamp with a sealing ring.

Tightening torque 18 31 5AZ.



Fasten transverse reinforcement (1).



18 12 031 Replacing front silencer (N18)



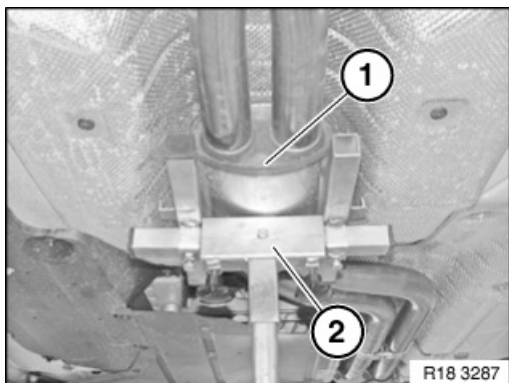
Warning!

Risk of burning!

Only perform this repair work after engine has cooled down.

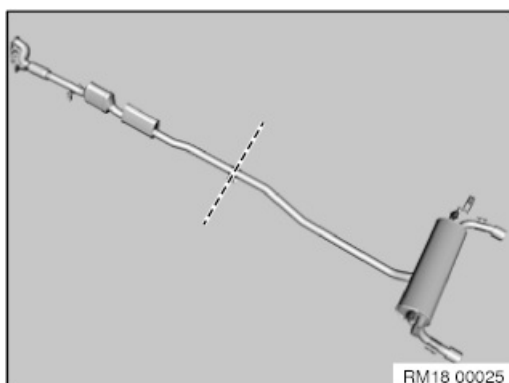
Danger of injury!

Removal of the exhaust system must be carried out with the assistance of a second person.



Support exhaust system (1) with a suitable jack (2).

Protect the front and rear silencers from falling down.



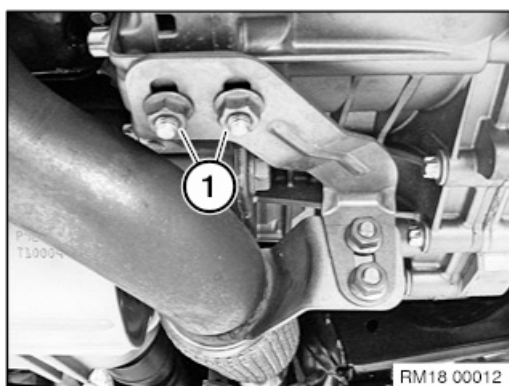
Note:

If the separation point is not marked by a punch mark in the pipe, determine the separation point by means of the pipe length on the new front silencer.

Carry over separation point to faulty front silencer and mark.

Secure front silencer against falling out.

Cut through exhaust pipes at marked point with a suitable tool.



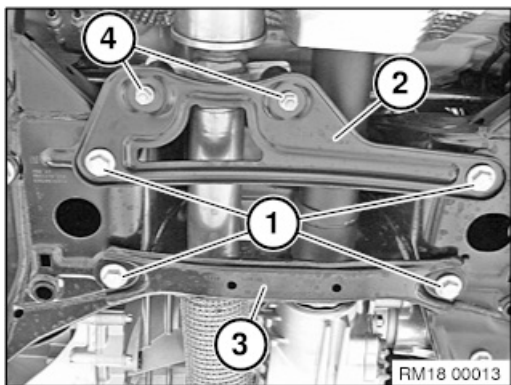
Unscrew nuts (1).

Tightening torque 18 31 7AZ.

Installation note:

Fit the holder to the new front silencer.





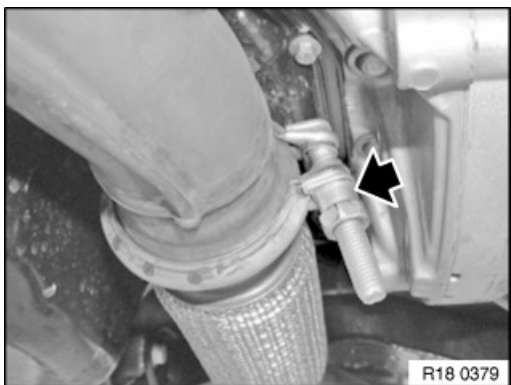
Release screws (1).

Tightening torque 18 31 9AZ.

Unscrew nuts (4).

Tightening torque 18 31 8AZ.

Remove reinforcement plate (2) and reinforcement strut (3).



Unfasten clamp.

Tightening torque 18 31 5AZ.

Lower front silencer and remove.



Installation note:

Fit front silencer and connect with clamp.

Centre clamp and tighten down.

Tightening torque 18 31 6AZ.



Installation note:

Check rubber mount for damage.

If necessary, replace damaged rubber mounts.

Check exhaust system for leak tightness.



18 12 031 Replacing rear silencer (N18)



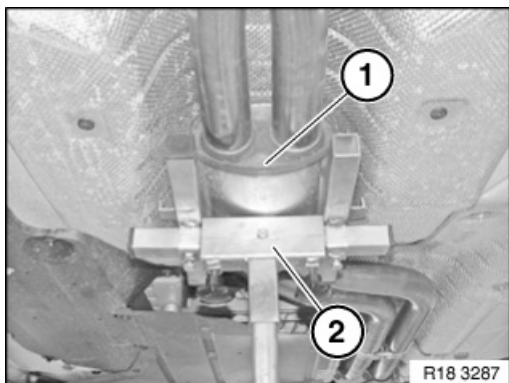
Warning!

Risk of burning!

Only perform this repair work after engine has cooled down.

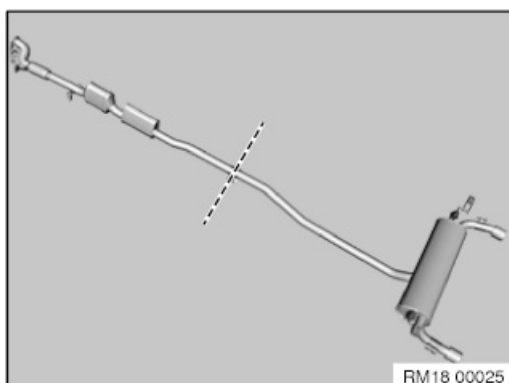
Danger of injury!

Removal of the exhaust system must be carried out with the assistance of a second person.



Support exhaust system (1) with a suitable jack (2).

Protect the front and rear silencers from falling down.



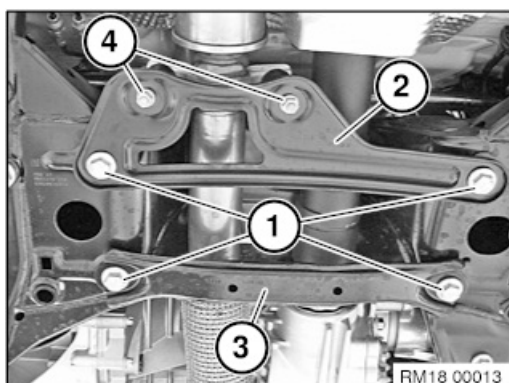
Note:

If the separation point line is not marked by a punch mark in the pipe, determine the separation point by means of the pipe length on the new rear silencer.

Carry over separation point to faulty rear silencer and mark.

Secure rear silencer against falling off.

Cut through exhaust pipes at marked point with a suitable tool.



Release screws (1).

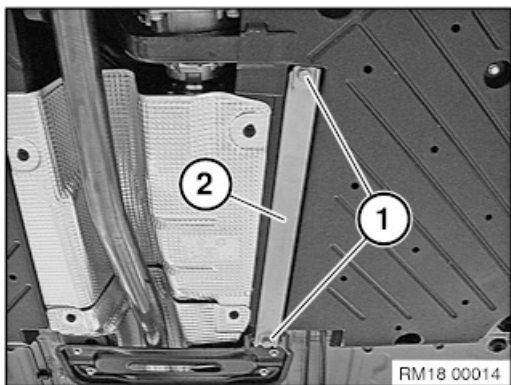
Tightening torque 18 31 9AZ.

Unscrew nuts (4).

Tightening torque 18 31 8AZ.

Remove reinforcement plate (2) and reinforcement strut (3).



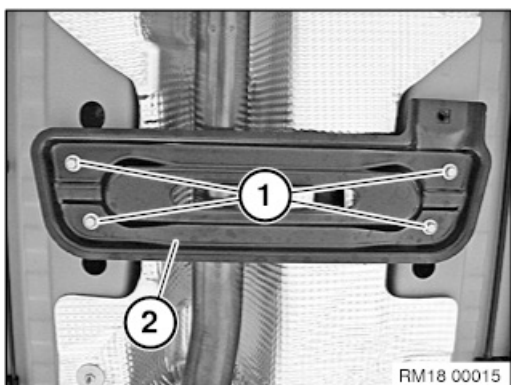


Vehicles with four-wheel drive only:

Release screws (1).

Tightening torque 33 31 4AZ.

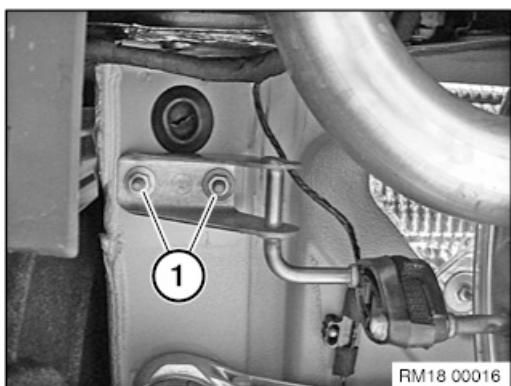
Remove stiffening strut(2).



Release screws (1).

Tightening torque 18 31 10AZ.

Remove reinforcement plate (2).



Release nuts (1) on rear silencer on left and right.

Tightening torque 18 31 11AZ.

Lower and remove rear silencer.



Installation note:

Adapt new rear silencer and connect using clamp.

Centre clamp and tighten down.

Tightening torque 18 31 6AZ.



Installation note:

Check rubber mount for damage.

If necessary, replace damaged rubber mounts.

Check exhaust system for leak tightness.







Warning!

Risk of burning!

This repair work may only be carried out on an exhaust system which has cooled down.



Necessary preliminary work:

- Move front panel into working position.

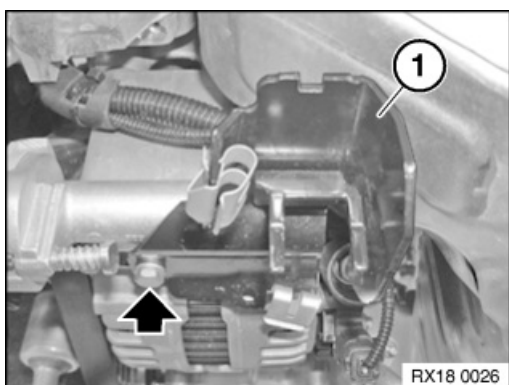


Note:

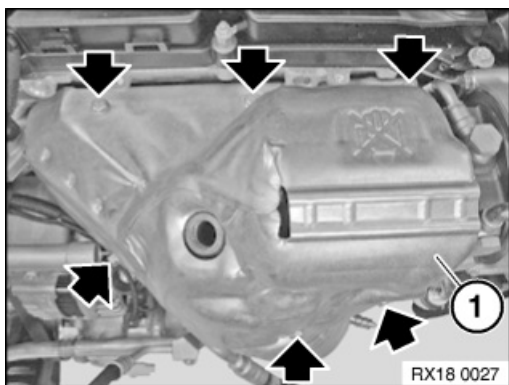
The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove the control sensor .

Remove monitoring sensor .



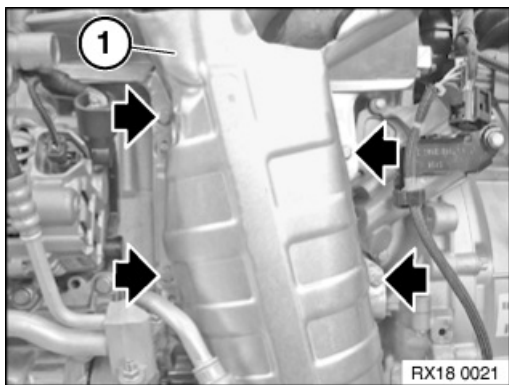
Release screw and remove holder (1).



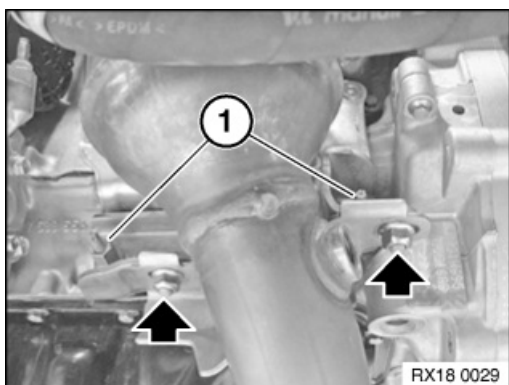
Release screws and remove upper heat shield (1).

Tightening torque 11 65 7AZ.



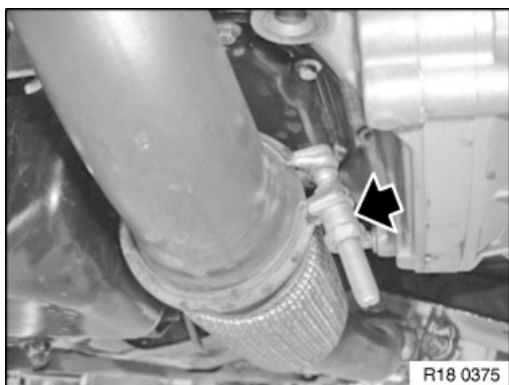


Release screws and remove lower heat shield (1).
Tightening torque 11 65 7AZ.

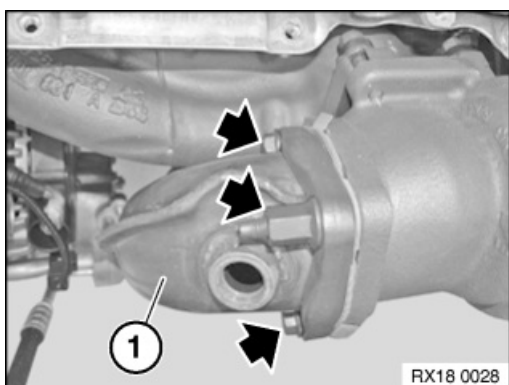


Loosen nuts.
Installation note:
Replace nuts.
Tightening torque 18 31 3AZ.

Unscrew nuts (1).
Tightening torque 18 31 4AZ.



Unfasten clamp.
Tightening torque 18 31 5AZ.



Loosen screws and nut.
Feed out catalytic converter (1) and remove.
Installation note:

- Renew gasket.
- Clean sealing surfaces.
- Apply a thin coating of copper paste to bolt thread.
- Tightening torque 18 31 1AZ.





Special tools required:

- 17 2 051



Warning!

Risk of burning!

This repair work may only be carried out on an exhaust system which has cooled down.



Important!

Gaiter and charge air hoses with clamp fastenings must be installed dry and free from grease!

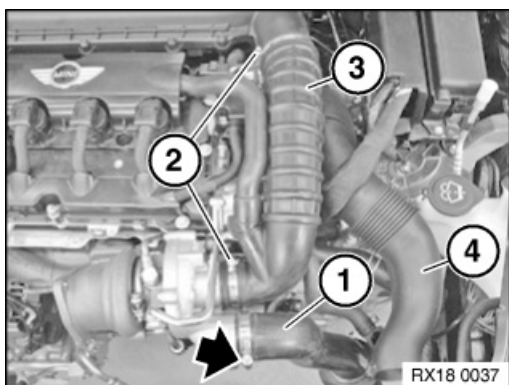
Sealing surfaces and connecting branches must be dry and free from grease.

If gaiter and charge air hoses with clamp fastenings are not installed dry and free from grease, this may result in exhaust turbocharger failure!



Necessary preliminary tasks:

- Drain coolant.
- Remove coolant expansion tank.
- Remove the catalytic converter.



Release the clamp and detach the charge air duct (1).

Release clamps (2) and pull off gaiter (3).

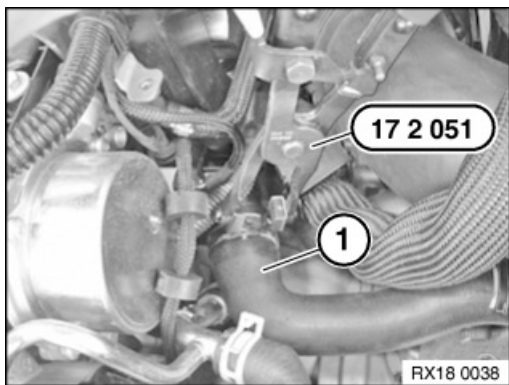
Remove intake pipe (4).

Installation note:

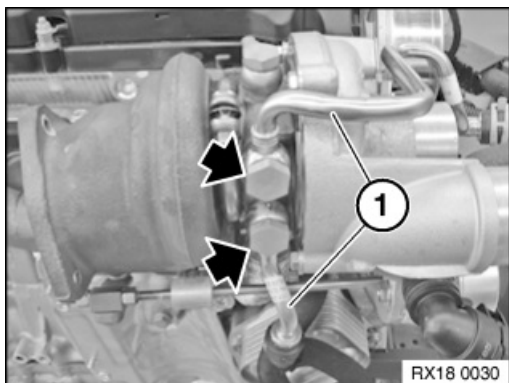
Install gaiter (3) and charge-air duct (1) dry and free from grease.

Connecting branch on exhaust turbocharger must be dry and free from grease.





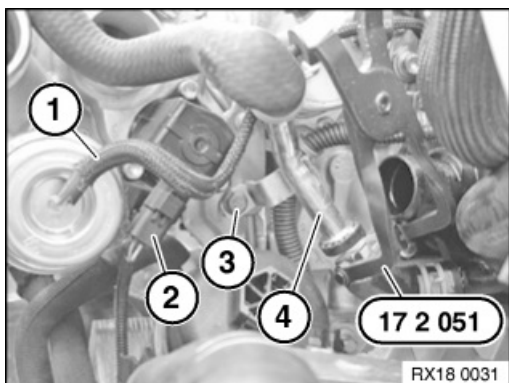
Release the spring strap using special tool 17 2 051 and pull off the coolant hose (1).



Release screws and detach lines (1). *Installation note:*
Replace gaskets.

Tightening torque N1411 65 8AZ .

Tightening torque N1811 65 9AZ.

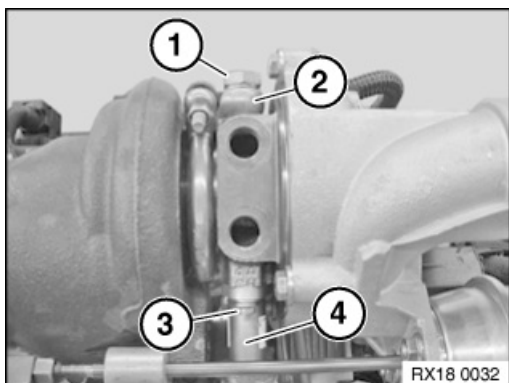


Pull off hose (1).

Unlock connector (2) and remove.

Release screw (3).

Release spring strap with special tool 17 2 051 . Pull off line (4) and remove.



Release screw (1) and detach line (2).

Installation note:
Replace gaskets.

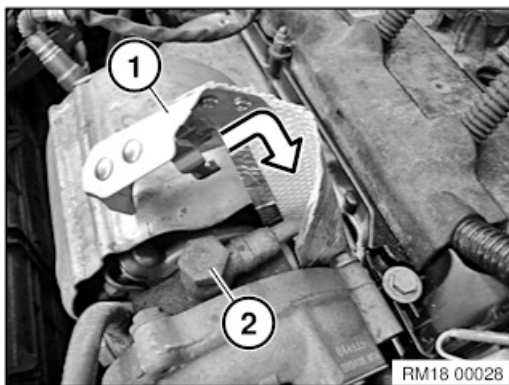
Tightening torque: 11 65 4AZ.

Release screw (3) and detach line (4).

Installation note:
Replace sealing ring.

Tightening torque 11 65 5AZ.





Installation note:

When fitting engine oil pipe and banjo bolt, install thermal protection (1) (see Electronic Parts Catalogue).

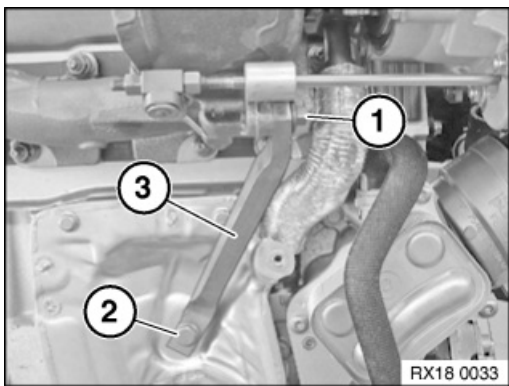
Wrap thermal protection around engine oil pipe.

Check banjo bolt (2) and engine oil pipe for blockage. Replace blocked banjo bolt and engine oil pipe.



Installation note:

Make sure that thermal protection clamp (1) engages correctly.

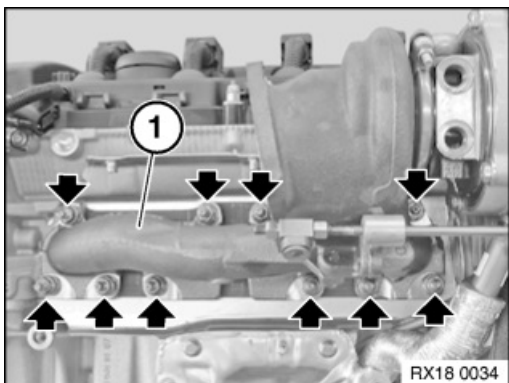


Release screw (1).

Tightening torque 11 65 3AZ .

Release screw (2) and remove holder (3).

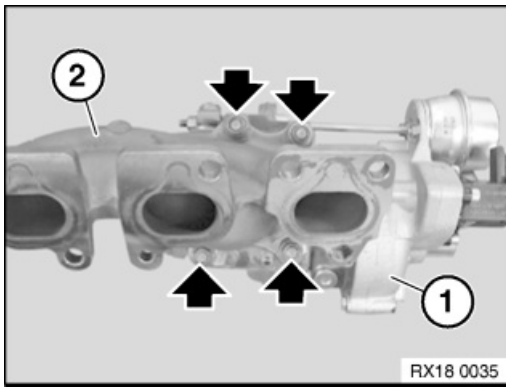
Tightening torque 11 65 6AZ .



Release nuts and remove exhaust manifold (1). *Installation note:*

- Replace gasket and nuts.
- Clean sealing surfaces.
- Apply a thin coat of copper paste to thread.
- Tightening torque 18 40 1AZ .





Release nuts and remove exhaust turbocharger (1) from exhaust manifold (2).

Observe important information during removal or replacement of the exhaust turbocharger!

Installation note:

- Replace gasket and nuts.
- Clean sealing surfaces.
- Apply a thin coat of copper paste to thread.
- Tightening torque 11 65 1AZ .



Note:

Assemble engine.

Top up coolant.

Check engine oil level.

Clear DME fault memory.



**Prerequisite:**

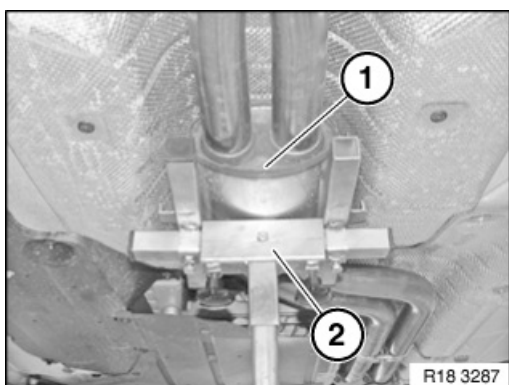
To carry out this repair work, the mechatronics technician must be trained in the use of welders.

Additionally required:

- MAG (metal active gas) welder
- **Stainless steel welding wire** (European material number 1.4370)
- (Wire cannot be obtained through the BMW dealer organisation!)
- Mixed gas (82 % argon, 18 % carbon dioxide)

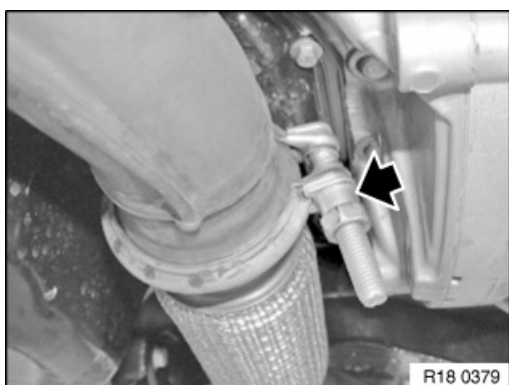
**Warning!****Risk of burning!**

Only perform this repair work on an engine that has cooled down.



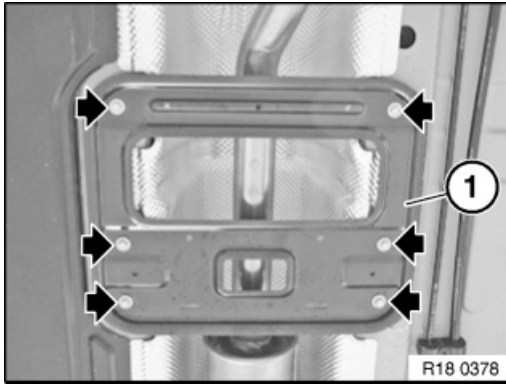
Support exhaust system (1) with a suitable jack (2).

Secure exhaust system against falling off.



Unfasten clamp.





Support exhaust system with a suitable jack.

Release screws and remove transverse reinforcement (1).

Lower exhaust system.



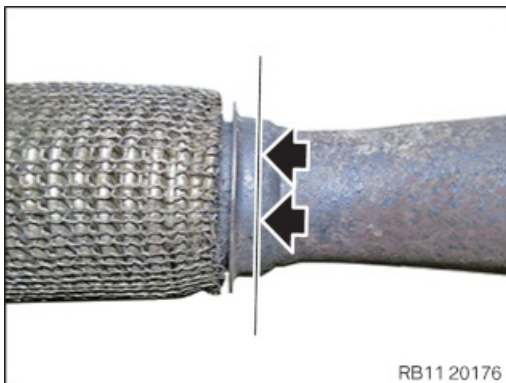
Attention!

Exclusively separate the outer shell.

Do not completely cut through flexible tube; inner pipe must remain intact.

Ensure that the cut line and the edge of the flexible tube are parallel.

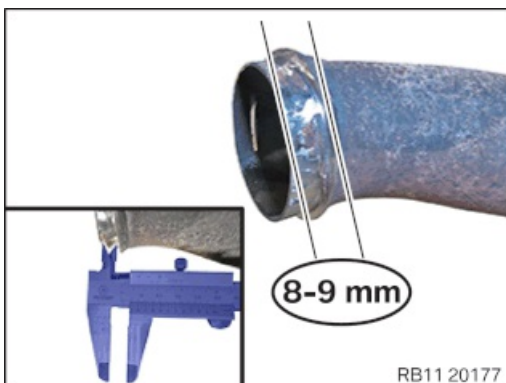
Perform process in the same way at other end of flexible tube.



Cut all around the mark along the weld seam by 2 to 3 mm (see arrow).

Cut uniformly all around until the flexible tube can be disconnected from the weld seam using a suitable tool.

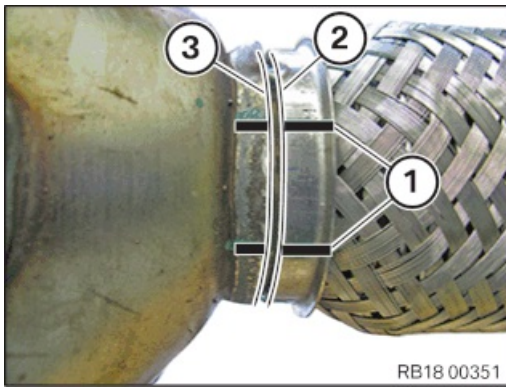
The inner pipe must stay on the weld seam.



Note:

The inner pipe must remain intact 8-9 mm on the exhaust pipe.





Connect a new flexible tube to the inner pipe and align it.

Note:

Make sure that flexible tube (2) is parallel to cutting edge (3).

Observe distance of approx. 1-2 mm between flexible tube (2) and weld seam (3).

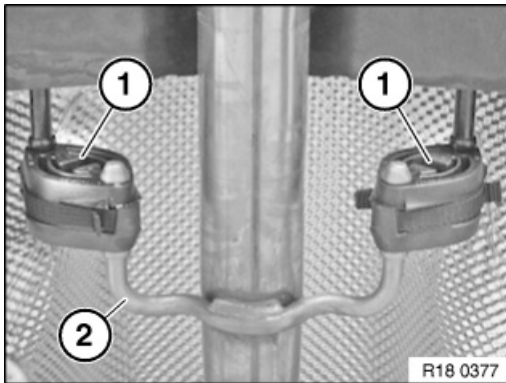
Weld flexible tube (1) all around on both sides.

Use stainless steel welding wire.

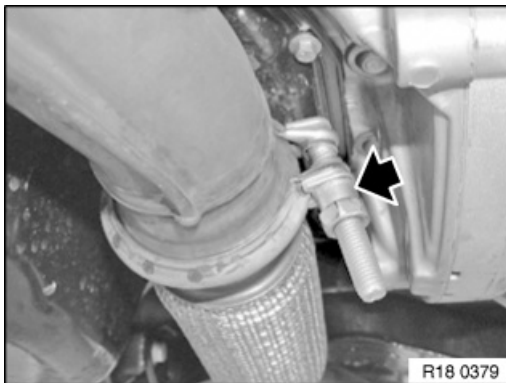
Graphic: N47.



Required follow-up work:

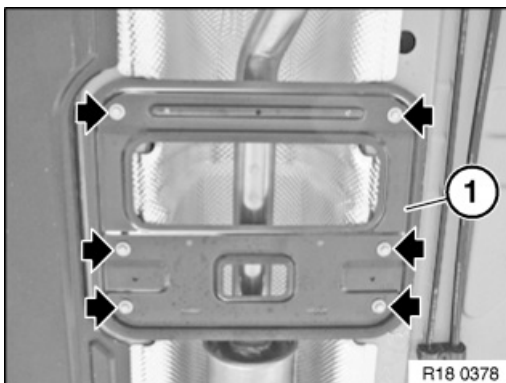


Attach rubber mount (1) of exhaust bracket (2).



Install a new clamp with a sealing ring.

Tightening torque 18 31 5AZ.



Fasten transverse reinforcement (1).





Warning!

Risk of burning!

This repair work may only be carried out on an exhaust system which has cooled down.



Necessary preliminary work:

- Move front panel into working position.

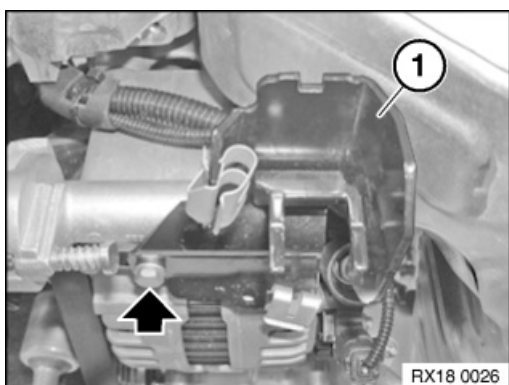


Note:

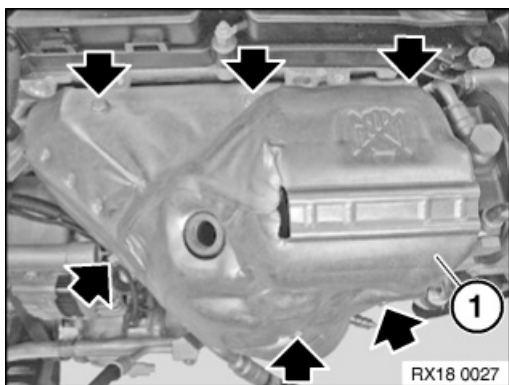
The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove the control sensor .

Remove monitoring sensor .



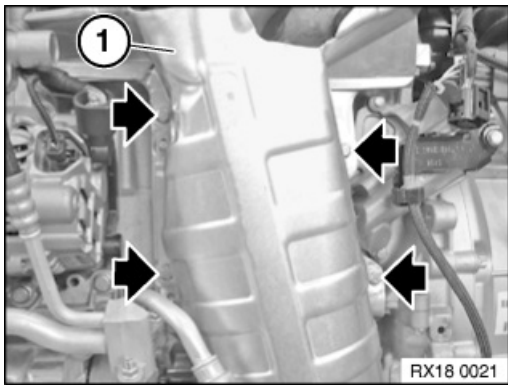
Release screw and remove holder (1).



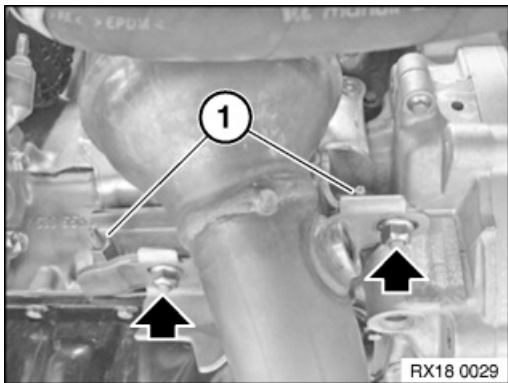
Release screws and remove upper heat shield (1).

Tightening torque 11 65 7AZ.



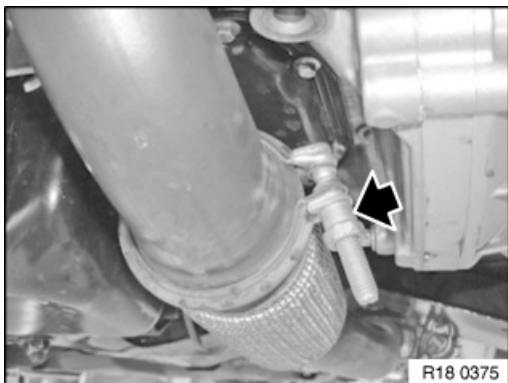


Release screws and remove lower heat shield (1).
Tightening torque 11 65 7AZ.

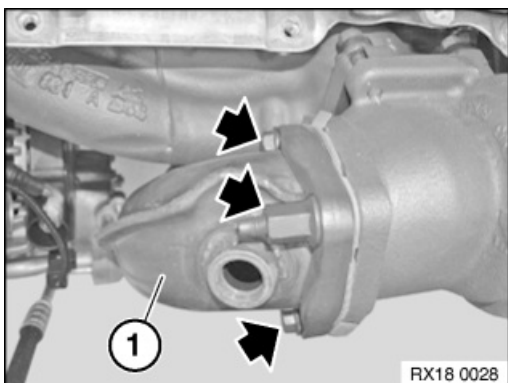


Loosen nuts.
Installation note:
Replace nuts.
Tightening torque 18 31 3AZ.

Unscrew nuts (1).
Tightening torque 18 31 4AZ.



Unfasten clamp.
Tightening torque 18 31 5AZ.



Loosen screws and nut.
Feed out catalytic converter (1) and remove.
Installation note:

- Renew gasket.
- Clean sealing surfaces.
- Apply a thin coating of copper paste to bolt thread.
- Tightening torque 18 31 1AZ.





Special tools required:

- 17 2 051



Warning!

Risk of burning!

This repair work may only be carried out on an exhaust system which has cooled down.



Important!

Gaiter and charge air hoses with clamp fastenings must be installed dry and free from grease!

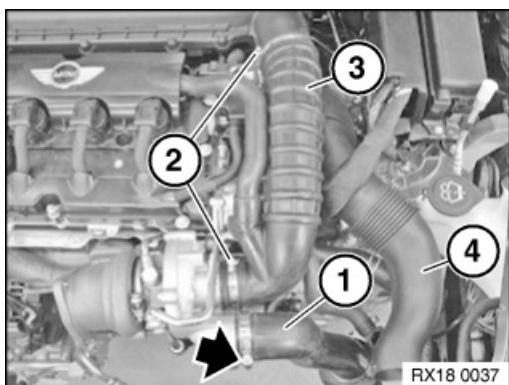
Sealing surfaces and connecting branches must be dry and free from grease.

If gaiter and charge air hoses with clamp fastenings are not installed dry and free from grease, this may result in exhaust turbocharger failure!



Necessary preliminary tasks:

- Drain coolant.
- Remove coolant expansion tank.
- Remove the catalytic converter.



Release the clamp and detach the charge air duct (1).

Release clamps (2) and pull off gaiter (3).

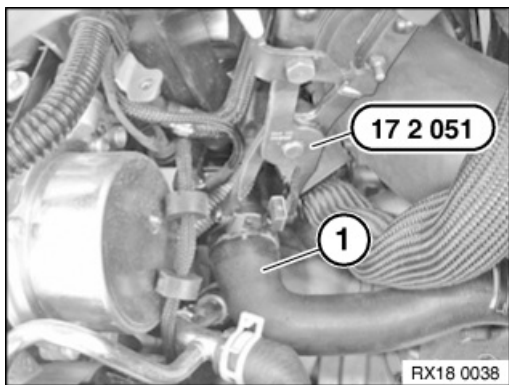
Remove intake pipe (4).

Installation note:

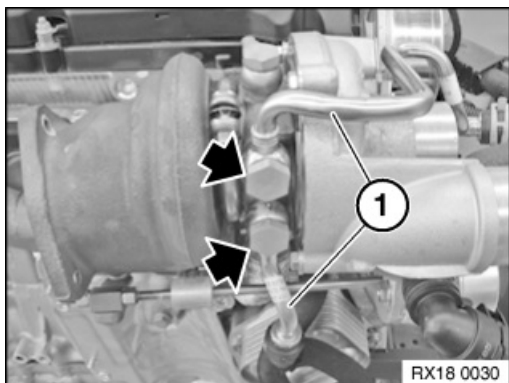
Install gaiter (3) and charge-air duct (1) dry and free from grease.

Connecting branch on exhaust turbocharger must be dry and free from grease.





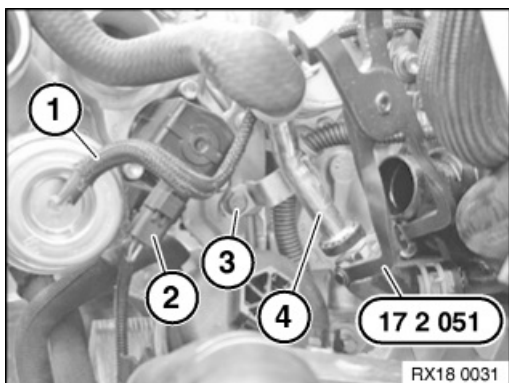
Release the spring strap using special tool 17 2 051 and pull off the coolant hose (1).



Release screws and detach lines (1). *Installation note:*
Replace gaskets.

Tightening torque N1411 65 8AZ .

Tightening torque N1811 65 9AZ.

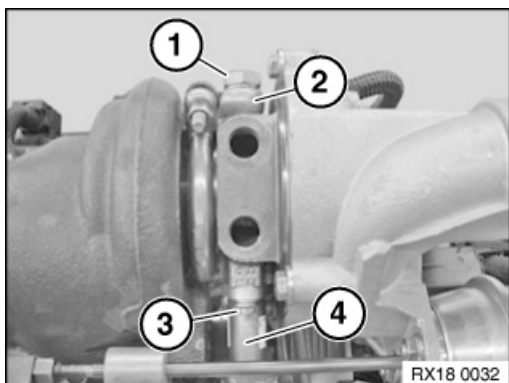


Pull off hose (1).

Unlock connector (2) and remove.

Release screw (3).

Release spring strap with special tool 17 2 051 . Pull off line (4) and remove.



Release screw (1) and detach line (2).

Installation note:
Replace gaskets.

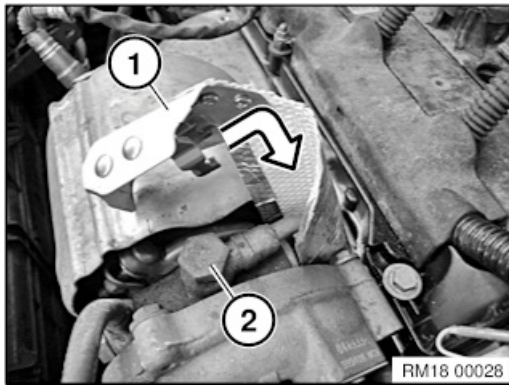
Tightening torque: 11 65 4AZ.

Release screw (3) and detach line (4).

Installation note:
Replace sealing ring.

Tightening torque 11 65 5AZ.



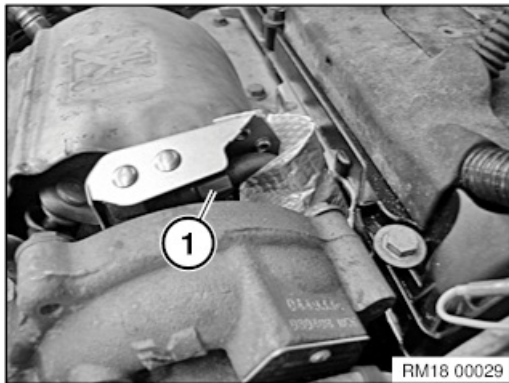


Installation note:

When fitting engine oil pipe and banjo bolt, install thermal protection (1) (see Electronic Parts Catalogue).

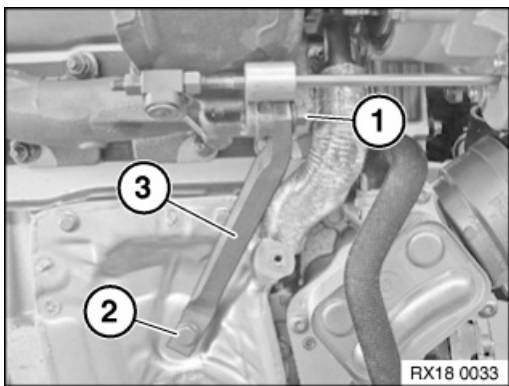
Wrap thermal protection around engine oil pipe.

Check banjo bolt (2) and engine oil pipe for blockage. Replace blocked banjo bolt and engine oil pipe.



Installation note:

Make sure that thermal protection clamp (1) engages correctly.

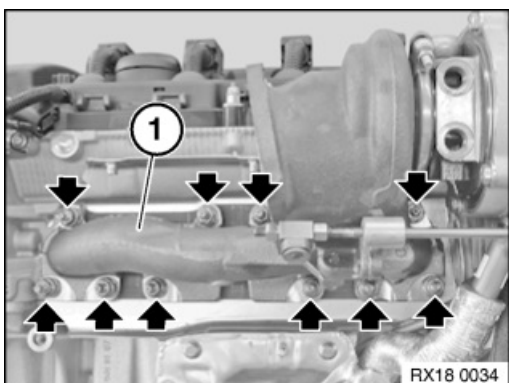


Release screw (1).

Tightening torque 11 65 3AZ .

Release screw (2) and remove holder (3).

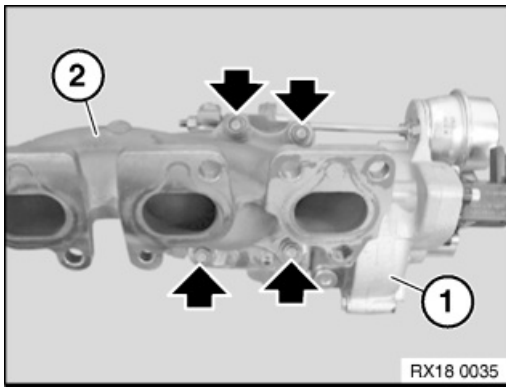
Tightening torque 11 65 6AZ .



Release nuts and remove exhaust manifold (1). *Installation note:*

- Replace gasket and nuts.
- Clean sealing surfaces.
- Apply a thin coat of copper paste to thread.
- Tightening torque 18 40 1AZ .





Release nuts and remove exhaust turbocharger (1) from exhaust manifold (2).

Observe important information during removal or replacement of the exhaust turbocharger!

Installation note:

- Replace gasket and nuts.
- Clean sealing surfaces.
- Apply a thin coat of copper paste to thread.
- Tightening torque 11 65 1AZ .



Note:

Assemble engine.

Top up coolant.

Check engine oil level.

Clear DME fault memory.





Warning!

Risk of burning!

This repair work may only be carried out on an exhaust system which has cooled down.



Necessary preliminary work:

- Move front panel into working position.

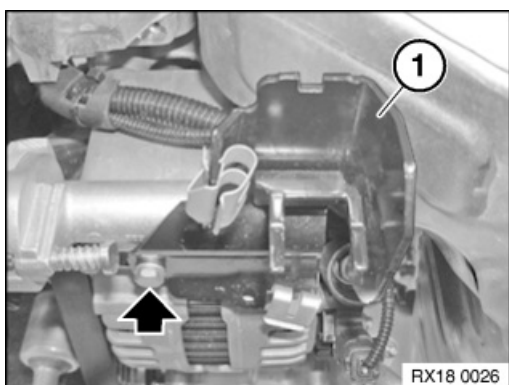


Note:

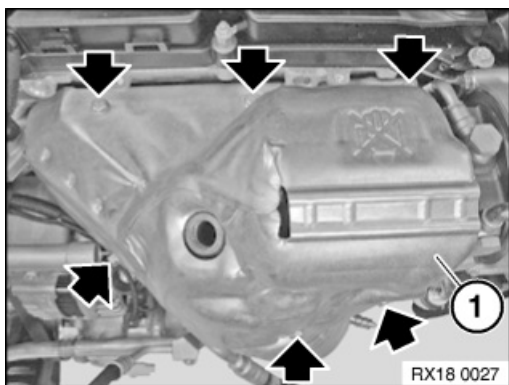
The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove the control sensor .

Remove monitoring sensor .



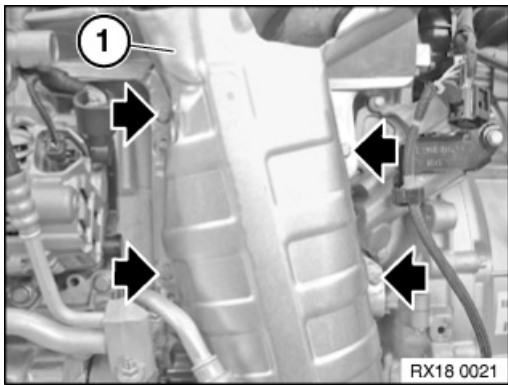
Release screw and remove holder (1).



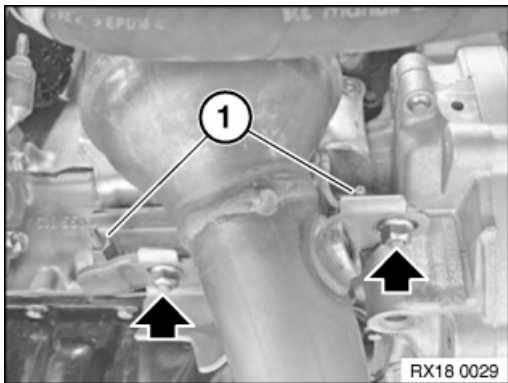
Release screws and remove upper heat shield (1).

Tightening torque 11 65 7AZ.



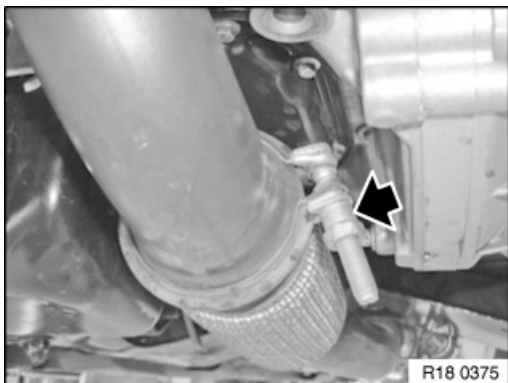


Release screws and remove lower heat shield (1).
Tightening torque 11 65 7AZ.

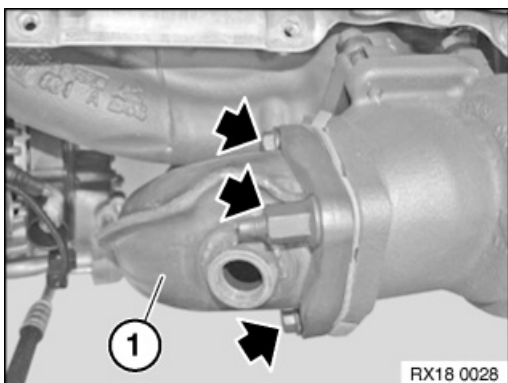


Loosen nuts.
Installation note:
Replace nuts.
Tightening torque 18 31 3AZ.

Unscrew nuts (1).
Tightening torque 18 31 4AZ.



Unfasten clamp.
Tightening torque 18 31 5AZ.



Loosen screws and nut.
Feed out catalytic converter (1) and remove.
Installation note:

- Renew gasket.
- Clean sealing surfaces.
- Apply a thin coating of copper paste to bolt thread.
- Tightening torque 18 31 1AZ.





Special tools required:

- 17 2 051



Warning!

Risk of burning!

This repair work may only be carried out on an exhaust system which has cooled down.



Important!

Gaiter and charge air hoses with clamp fastenings must be installed dry and free from grease!

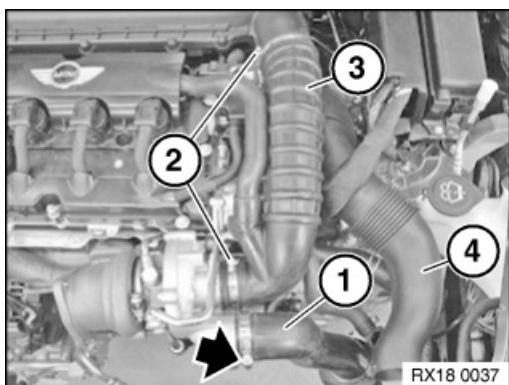
Sealing surfaces and connecting branches must be dry and free from grease.

If gaiter and charge air hoses with clamp fastenings are not installed dry and free from grease, this may result in exhaust turbocharger failure!



Necessary preliminary tasks:

- Drain coolant.
- Remove coolant expansion tank.
- Remove the catalytic converter.



Release the clamp and detach the charge air duct (1).

Release clamps (2) and pull off gaiter (3).

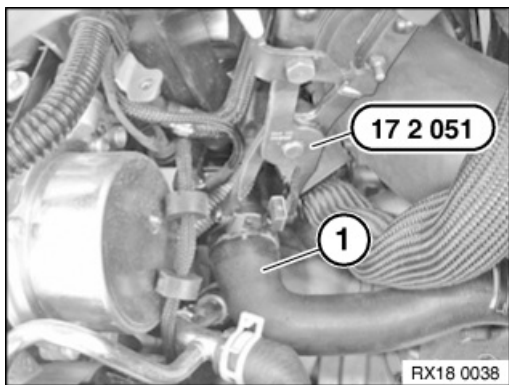
Remove intake pipe (4).

Installation note:

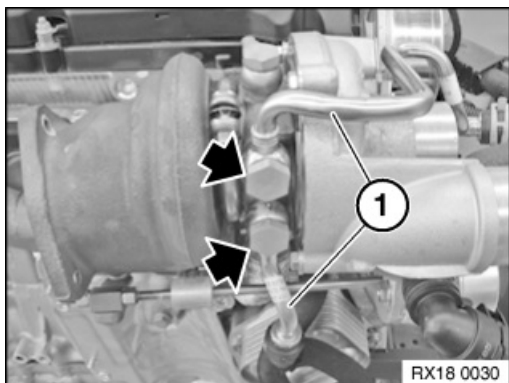
Install gaiter (3) and charge-air duct (1) dry and free from grease.

Connecting branch on exhaust turbocharger must be dry and free from grease.





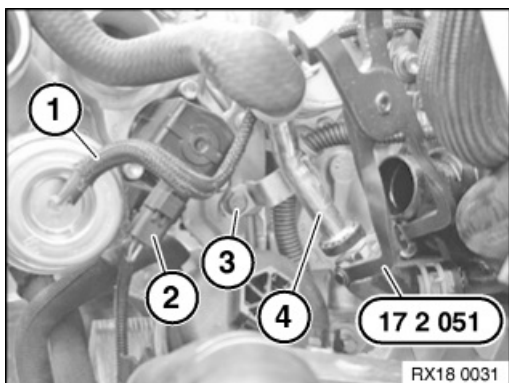
Release the spring strap using special tool 17 2 051 and pull off the coolant hose (1).



Release screws and detach lines (1). *Installation note:*
Replace gaskets.

Tightening torque N1411 65 8AZ .

Tightening torque N1811 65 9AZ.

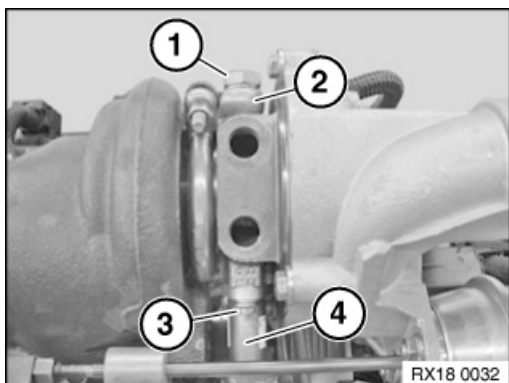


Pull off hose (1).

Unlock connector (2) and remove.

Release screw (3).

Release spring strap with special tool 17 2 051 . Pull off line (4) and remove.



Release screw (1) and detach line (2).

Installation note:
Replace gaskets.

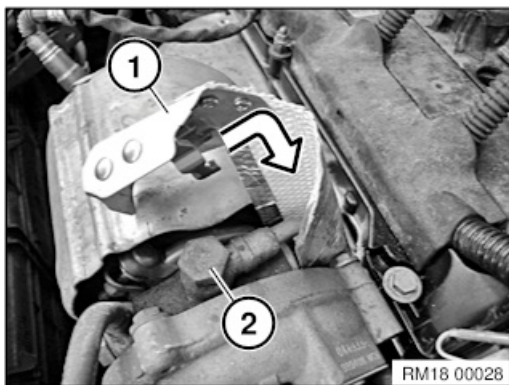
Tightening torque: 11 65 4AZ.

Release screw (3) and detach line (4).

Installation note:
Replace sealing ring.

Tightening torque 11 65 5AZ.



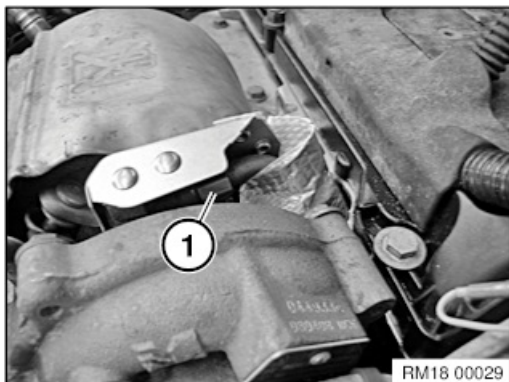


Installation note:

When fitting engine oil pipe and banjo bolt, install thermal protection (1) (see Electronic Parts Catalogue).

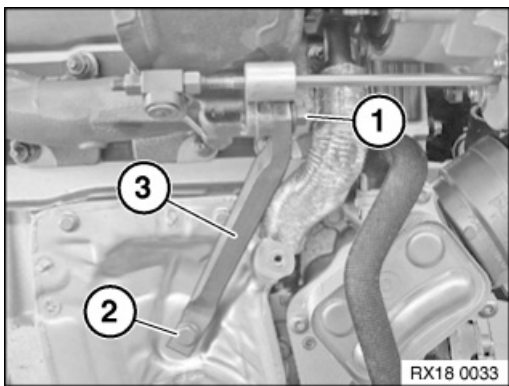
Wrap thermal protection around engine oil pipe.

Check banjo bolt (2) and engine oil pipe for blockage. Replace blocked banjo bolt and engine oil pipe.



Installation note:

Make sure that thermal protection clamp (1) engages correctly.

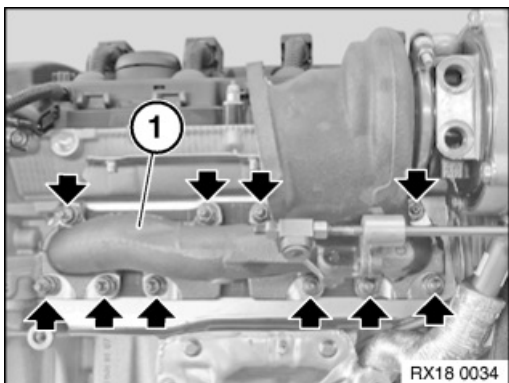


Release screw (1).

Tightening torque 11 65 3AZ .

Release screw (2) and remove holder (3).

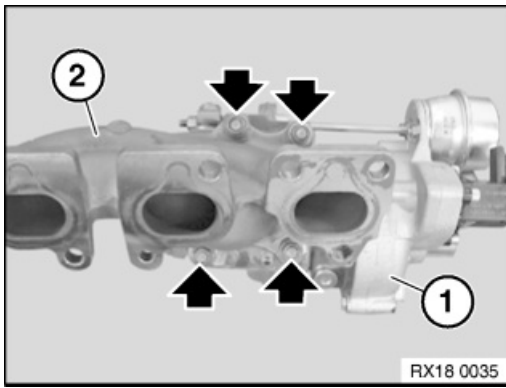
Tightening torque 11 65 6AZ .



Release nuts and remove exhaust manifold (1). *Installation note:*

- Replace gasket and nuts.
- Clean sealing surfaces.
- Apply a thin coat of copper paste to thread.
- Tightening torque 18 40 1AZ .





Release nuts and remove exhaust turbocharger (1) from exhaust manifold (2).

Observe important information during removal or replacement of the exhaust turbocharger!

Installation note:

- Replace gasket and nuts.
- Clean sealing surfaces.
- Apply a thin coat of copper paste to thread.
- Tightening torque 11 65 1AZ .



Note:

Assemble engine.

Top up coolant.

Check engine oil level.

Clear DME fault memory.



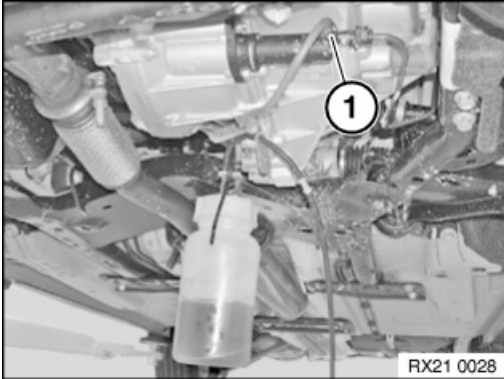
**Necessary preliminary work:**

- Connect bleeder unit to brake fluid expansion tank.

Important!

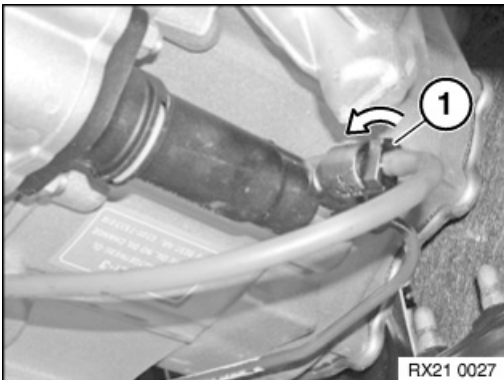
Check relevant equipment manufacturer's operating instructions for each device.

Charging pressure should not exceed 2 bar.



Remove dust cap from vent valve.

Connect vent hose to vent valve (1).



Open vent valve (1) and flush until clear brake fluid emerges without air bubbles.

Close vent valve.

Switch off bleeder unit or remove from expansion tank.

Correct brake fluid level in expansion tank.

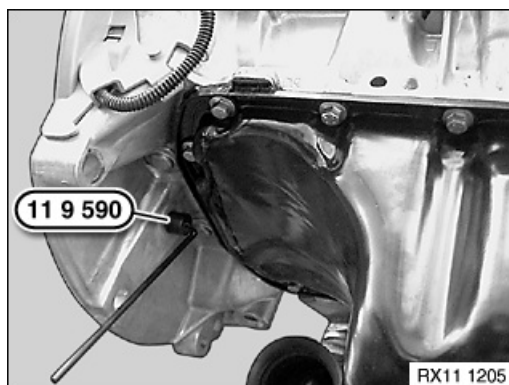


**Special tools required:**

- 11 9 590
- 21 2 170
- 21 0 010
- 21 0 000

**Necessary preliminary tasks:**

Remove transmission.

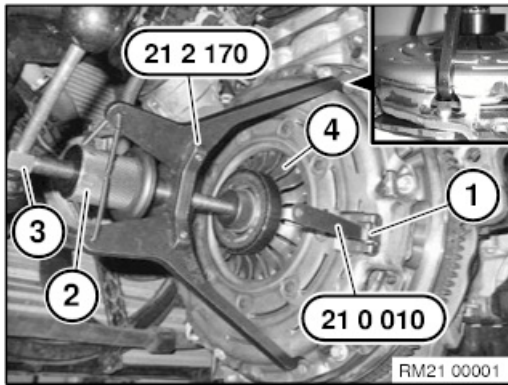


Lock flywheel with special tool 11 9 590 .



Observe the following procedure when installing the removed clutch and clutch disc.





Fit special tool 21 2 170 and tighten down at knurled screw (2).

Screw in spindle (3) (approx. 6-8 mm) until diaphragm spring (4) is tensioned on stop.

Insert special tool 21 0 010 in recess (1) and disable readjustment of the clutch.

The special tool must remain in the position shown until the clutch is refitted.

Important!

Only insert special tool 21 2 170 in the area of the riveting between pressure plate and spring on the cover.

Release screws and remove clutch from flywheel.

Installation note:

Clean flywheel and check for wear and damage.

Replace damaged flywheel.

The diaphragm spring tabs of pressure plate can differ in height up to 2 mm when removed.

Do not straighten under any circumstances!

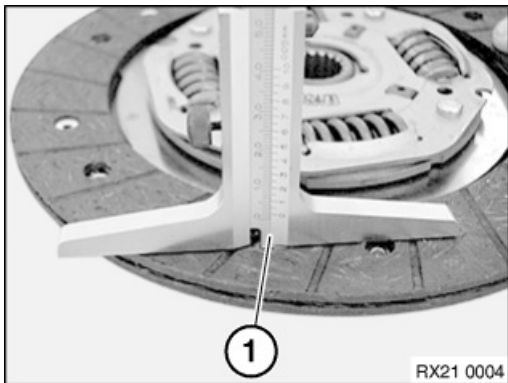
Important!

Always replace clutch discs fouled e.g. by oil, cleaning agent.

Before reinstallation, used clutch discs are to be cleaned and the grease on hub splines is to be renewed.

The transmission input shaft is to be cleaned but **not** greased.

New clutch discs are already greased.



Graphic similar.

Check clutch disc for wear.

Measure lining protrusion on transmission side.

Measure from rivet head (1).

The clutch disc must be replaced if the lining protrusion at the rivet head (1) is less than 0.5 mm.

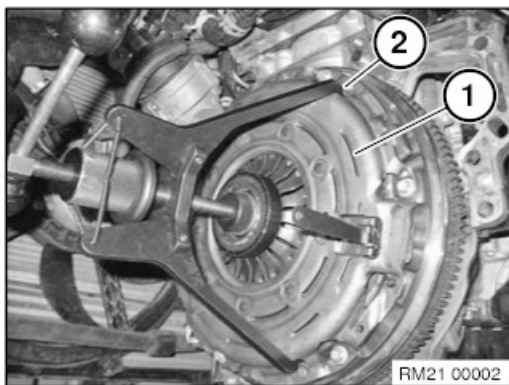


Centre clutch disc (1) with special tool 21 0 000 .**Important!**

Install clutch disc in correct position.

Handle clutch disc with care. Do not touch surfaces of friction linings.





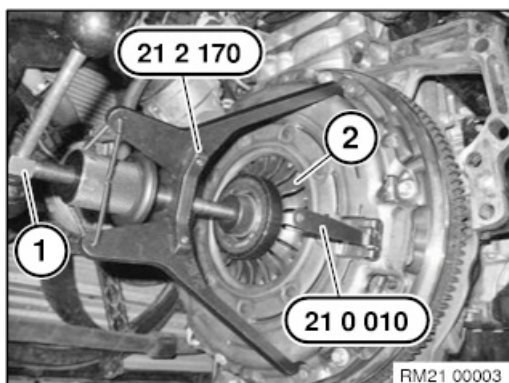
Fit clutch (1) to flywheel.

Tighten clutch screws crosswise.

Tightening torque 21 21 5AZ.

Note:

Clutch (1) must be secured by way of dowel pins (2).



Release spindle (1) until load is fully removed from diaphragm spring (2)

Remove special tools 21 2 170 and 21 0 000 .



Withdraw special tool from clutch disc with aid of accompanying screw (1).



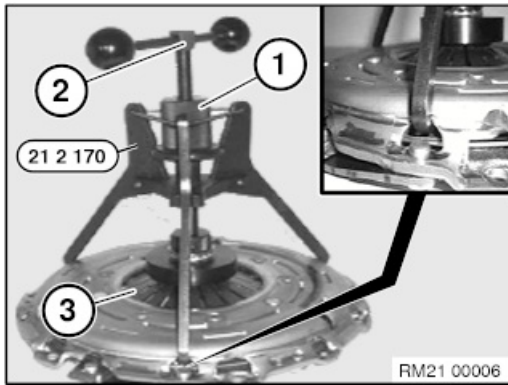
Installing new clutch



Vehicles up to model year 02/2013:

When fitting a new clutch, it is imperative that the over-centre helper spring of the pedal mechanism is replaced at the same time.





Important!

Only insert special tool 21 2 170 in the area of the riveting between pressure plate and spring on the cover.

Fit special tool 21 2 170 to pressure plate and tighten at the knurled screw (1).

Screw in spindle (2) approx. 10-12 mm) until diaphragm spring (3) is tensioned on stop.

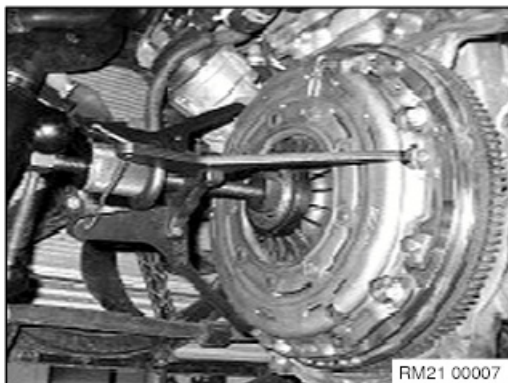
The diaphragm spring must not be pressed too far.



Centre clutch disc (1) with special tool 21 0 000 .**Important!**

Install clutch disc in correct position.

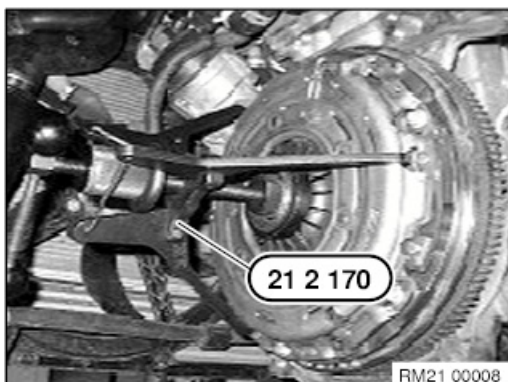
Handle clutch disc with care. Do not touch surfaces of friction linings.



Fit the pre-tensioned clutch.

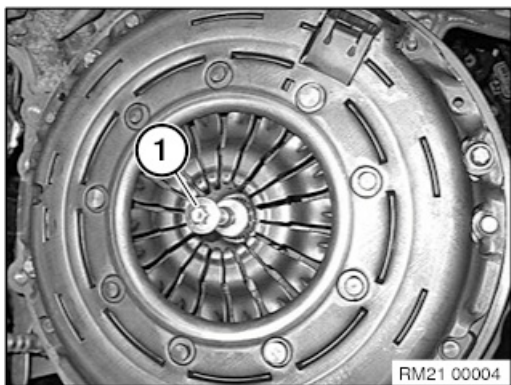
Tighten clutch screws crosswise.

Tightening torque 21 21 5AZ.



Remove special tool 21 2 170 .



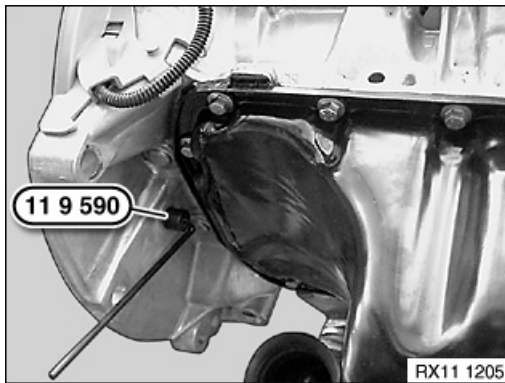


Withdraw special tool from clutch disc with aid of accompanying screw (1).

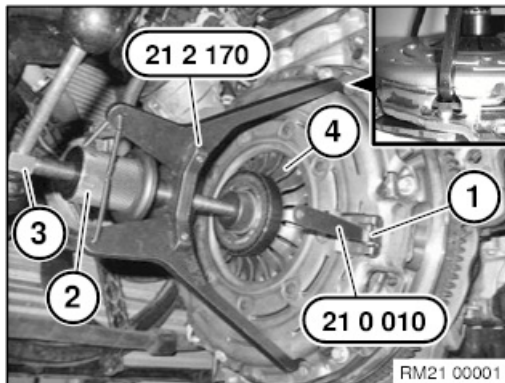


21 21 500 Removing and installing/replacing clutch

1 – Removing the clutch (SAT 235)

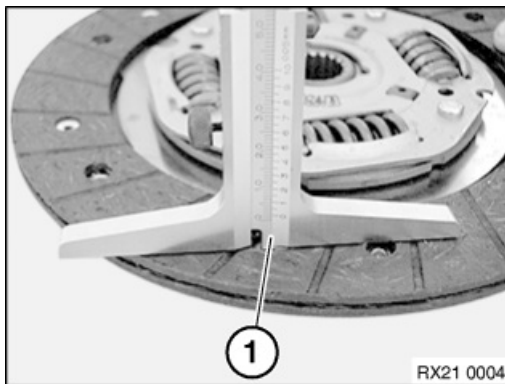


- Block flywheel with special tool [0 495 939 \(11 9 590\)](#).



- Position special tool [0 493 839 \(21 2 170\)](#) and tighten on the knurled screw (2).
- Screw in the spindle (3) (approximately 6-8 mm) until the diaphragm spring (4) has been pre-tensioned.
- Insert special tool [0 496 831 \(21 0 010\)](#) into the recess (1) and deactivate the clutch re-adjustment.
- Release screws and remove clutch from flywheel.

2 – Checking the clutch disc for wear



Check

- Measure the lining protrusion on the transmission side from the rivet head (1).

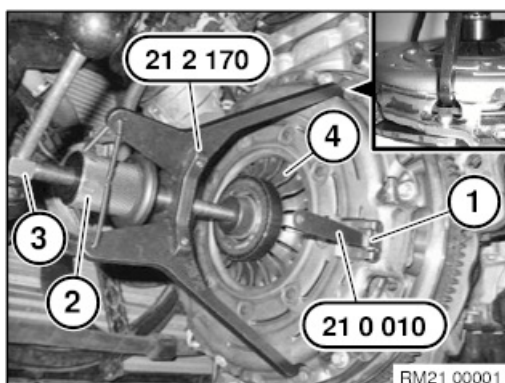
Result

- » The lining protrusion at the rivet head (1) amounts to less than 0.5 mm.

Measure

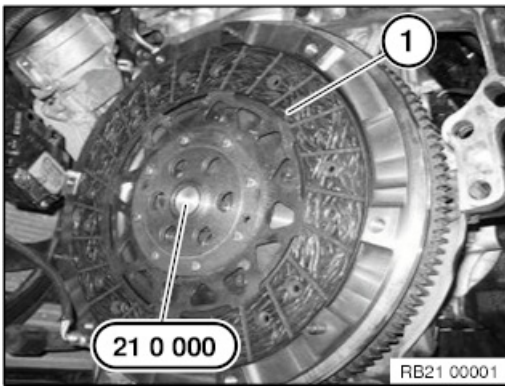
- Renew the clutch disc and pressure plate.

3 – Installing the clutch (re-installation)

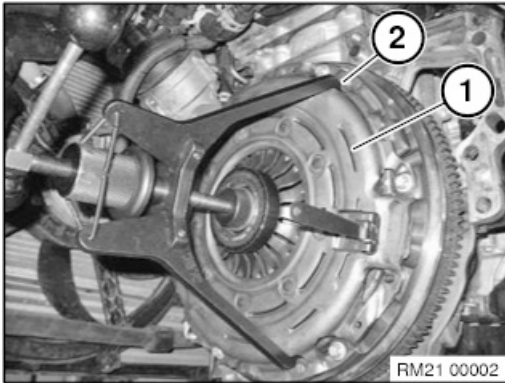


- Position special tool [0 493 839 \(21 2 170\)](#) and tighten on the knurled screw (2).
- Screw in the spindle (3) (approximately 6-8 mm) until the diaphragm spring (4) has been pre-tensioned.
- Insert special tool [0 496 831 \(21 0 010\)](#) into the recess (1) and deactivate the clutch re-adjustment.





- Centre the clutch disc (1) in the correct position using special tool [0 496 779 \(21 0 000\)](#).

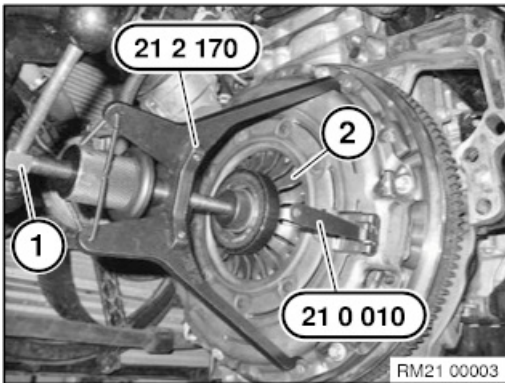


- Secure and install the clutch (1) on the flywheel using the dowel pins (2).
- Tighten the clutch screws crosswise.

Clutch to flywheel

Renew screws.

23 Nm



- Loosen the spindle (1) until the diaphragm spring (2) is fully relieved.
- Remove special tools [0 493 839 \(21 2 170\)](#) and [0 496 831 \(21 0 010\)](#).



- Pull out the special tool from the clutch disc using the enclosed screw (1).

4 – Installing the clutch (replacement)

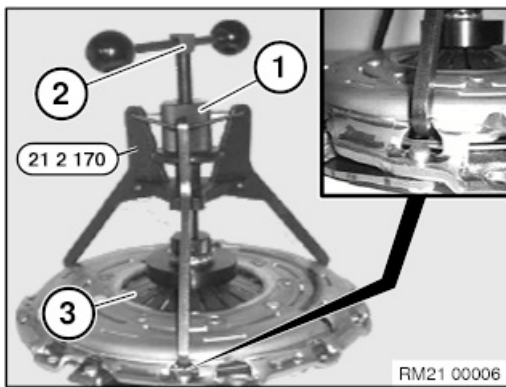


TECHNICAL INFORMATION

For vehicles up to version 02/2013:

When installing a new clutch, it is necessary to replace the return spring of the pedal mechanism too.
For additional information see: 35 31 050 Removing and installing/replacing the return spring.



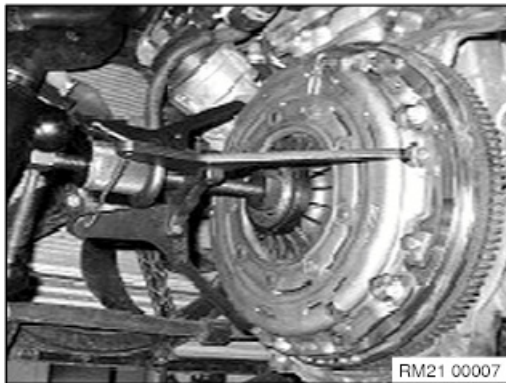


- Position special tool [0 493 839 \(21 2 170\)](#) on the pressure plate and tighten on the knurled screw (1).
- Screw in the spindle (2) (approximately 10-12 mm) until the diaphragm spring (3) has been pre-tensioned.

The diaphragm spring must not be pressed too far.



- Install the clutch disc (1) in correct position.
- Centre the clutch disc (1) using special tool [0 496 779 \(21 0 000\)](#).

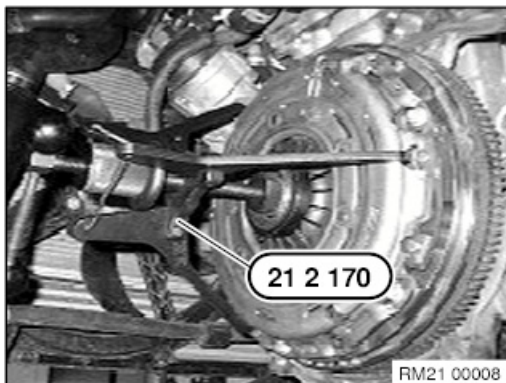


- Fit the pre-tensioned clutch.
- Tighten clutch screws crosswise.

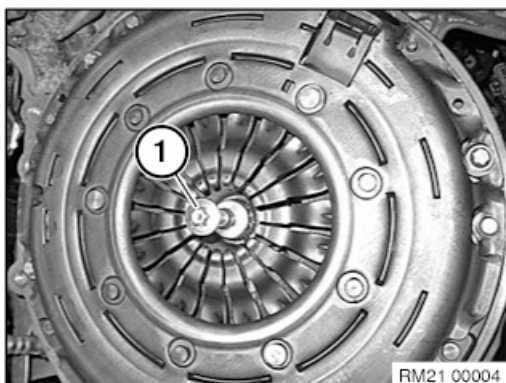
Clutch to flywheel

Renew screws.

23 Nm



- Remove special tool [0 493 839 \(21 2 170\)](#).



- Pull out the special tool from the clutch disc using the enclosed screw (1).

Additional Information



Overview of Tightening Torques

Clutch to flywheel

Used in step 34

Renew screws.	23 Nm
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Overview of Special Tools

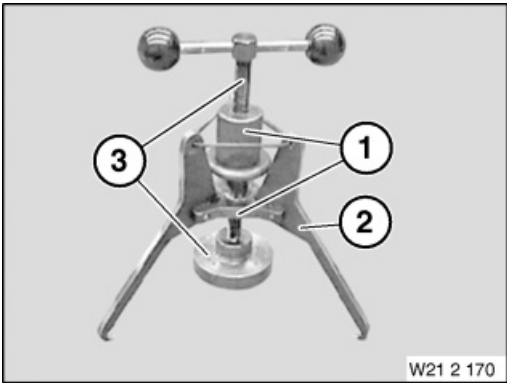
0 495 939 (11 9 590) Mandrel



Common Used in step 1

Usage	(Alignment pin) For locating crankshaft in TDC setting.
Included in the tool or work	
Storage location	B85
Replaced by	
In connection with	
SI-Number	01 26 06 (321)

0 493 839 (21 2 170) Device



Common Used in step 134

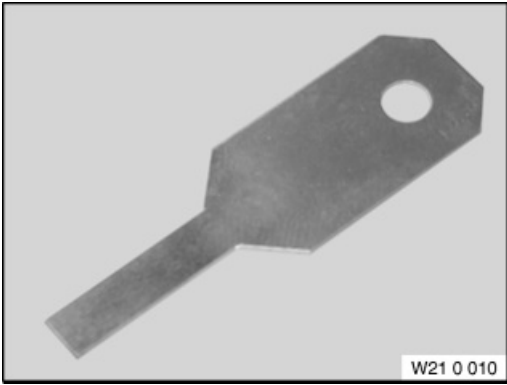
Usage	(tensioning device) For resetting adjusting ring and installing self-adjusting clutch on flywheel without tension.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 16 00 (622)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
1	0 494 558 (21 2 171)		Basic body (Basic body) Basic body with adjusting spindle Deletion, only available via tool set	
2	0 494 559 (21 2 172)		Claw (Clamping claw (1 piece)) Available as part of complete tool set 0493839 only.	
3	0 494 560 (21 2 173)		Spindle (Pressure spindle with washer) Available as part of complete tool set 0493839 only.	

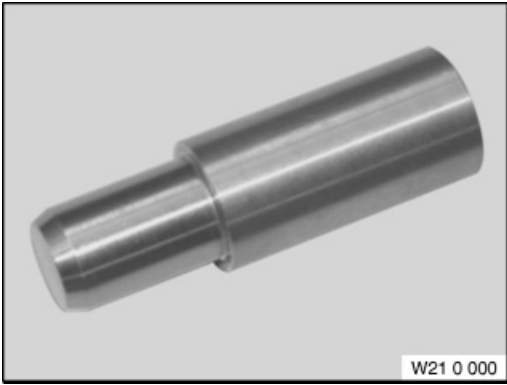


0 496 831 (21 0 010) Shaped part



Common		Used in step	13
Usage	For deactivating the adjustment system of the SAC.		
Included in the tool or work			
Storage location	B85		
Replaced by			
In connection with			
SI-Number	01 01 10 (616)		

0 496 779 (21 0 000) Mandrel



Common		Used in step	34
Usage	For centring the drive plate when installing on the engine.		
Included in the tool or work			
Storage location	B85		
Replaced by			
In connection with			
SI-Number	01 01 10 (616)		

Links

Repair instructions	Used in step
35 31 050 Removing and installing / replacing return spring \PREMIUM	4

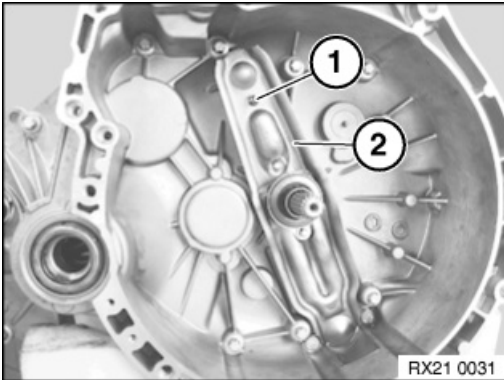


**Necessary preliminary tasks:**

- Transmission removed.
When installing a new clutch, you must replace the release bearing.

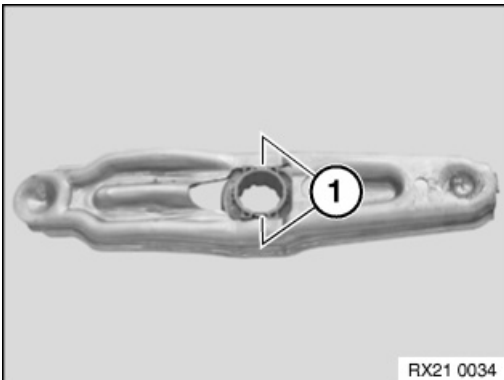
Installation note:

When replacing the clutch release lever, the ball pin must be replaced as well.



Press wire spring clip (1) through clutch release lever (2).

Remove clutch release lever (2).



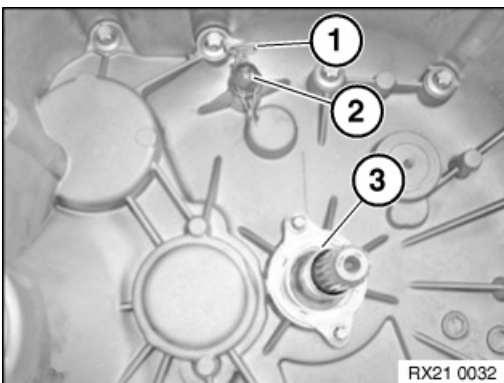
Press in clamps (1) slightly and remove clutch release bearing.

Installation note:

Clean all sliding surfaces on clutch release bearing.

Check for damage and replace if necessary.

Do not grease clutch release lever.

*Installation note:*

Check wire spring clip (1) and ball pin (2) for damage and replace if necessary.

Remove wire spring clip (1).

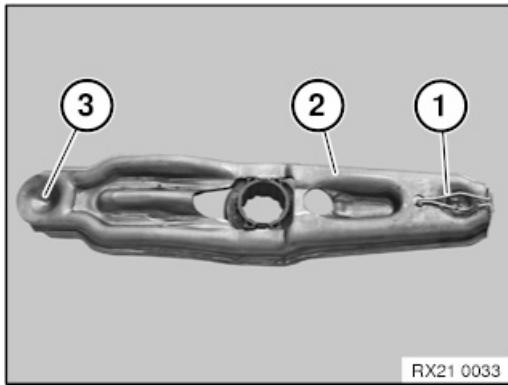
Lightly grease ball pin (2).

Clean the sliding surface of the guide sleeve (3).

Grease:

Refer to Service Operating Fluids





Install the wire spring clip (1) in the release lever (2).

Lightly grease the contact surface (3) of the release lever with the slave cylinder.

Install clutch release lever.



**Necessary preliminary work:**

- Remove underbody protection.

**Note:**

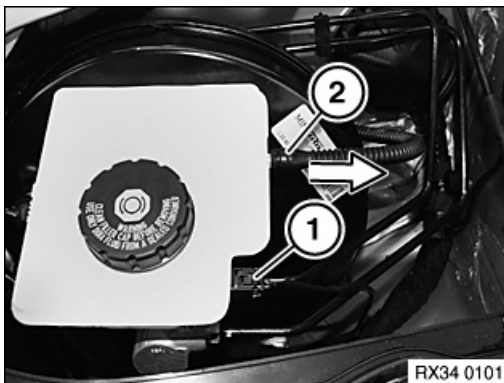
After completing work bleed clutch hydraulic system.

**Important!**

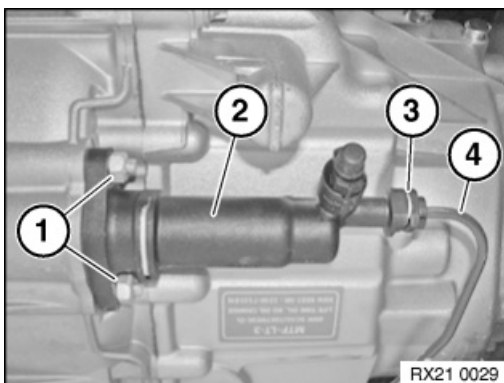
If possible, do not deflect push rod of clutch slave cylinder.

A deflection of the push rod caused by removal will cause easy escape of fluid. This escape of fluid does not mean that the clutch slave cylinder is damaged.

Replacement therefore not necessary!



Draw off brake fluid until level is below connection (2) to clutch master cylinder.



Release nuts (1) of clutch slave cylinder.

Remove clutch slave cylinder (2).

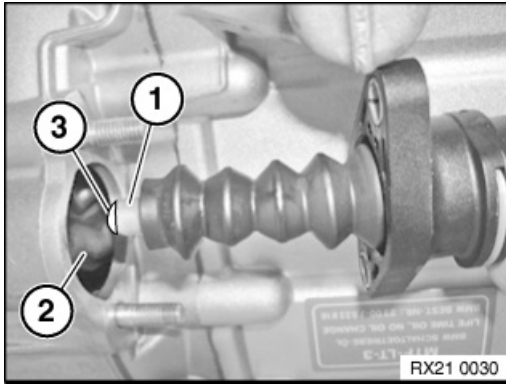
Release line connection (3) and disconnect line (4).

Tightening torque 21 52 2AZ.

Important!

Catch escaping brake fluid in a suitable container.





Installation note:

Clean synchronising key (1) and contact surface on release lever (2).

Lightly grease synchronising key (1) on contact surface (3).

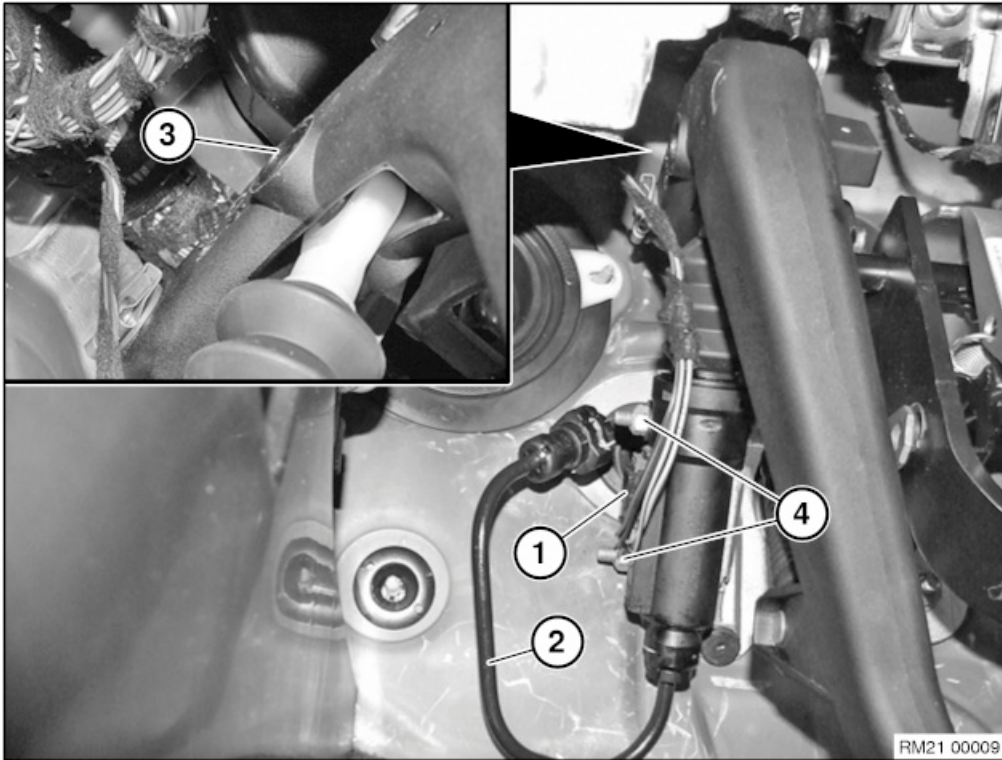
Grease,

refer to Service Operating Fluids.



**Necessary preliminary work:**

- Remove dashboard trim panel carrier at bottom left
- Draw off brake fluid until level is below connection to clutch master cylinder.



Disconnect plug connection (1) on clutch master cylinder.

Release quick-release connections of line (2) and remove line.

Important!

Catch brake fluid in a suitable collecting vessel.

Press bolt (3) together and press out.

Unscrew nuts (4).

Detach feed hose for clutch hydraulics and remove clutch master cylinder.

Installation note:

Replace self-locking nuts.

Tightening torque 21 52 3 AZ.

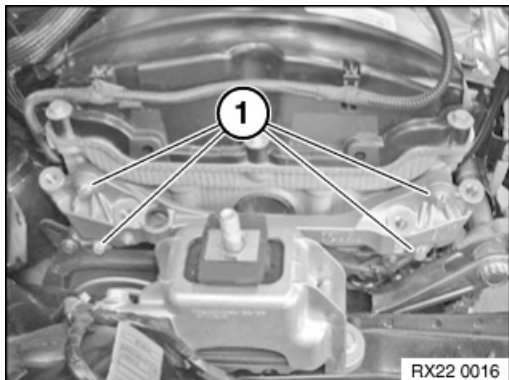
After completing work bleed clutch hydraulic system.





Necessary preliminary work:

- Remove engine mounting bracket



Release screws (1).

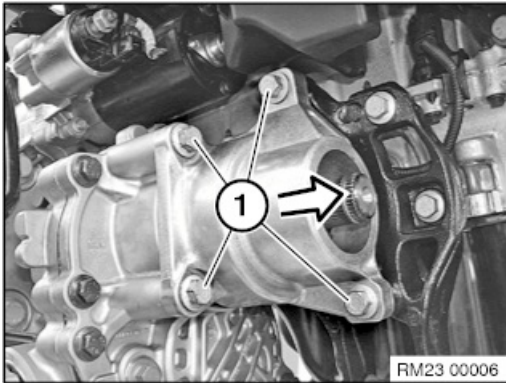
Tightening torque 22 11 3AZ.





Necessary preliminary work:

- Remove bracket with rubber mounting from below.
- Remove right output shaft
- All-wheel drive vehicle with manual gearbox only:
Remove transfer box

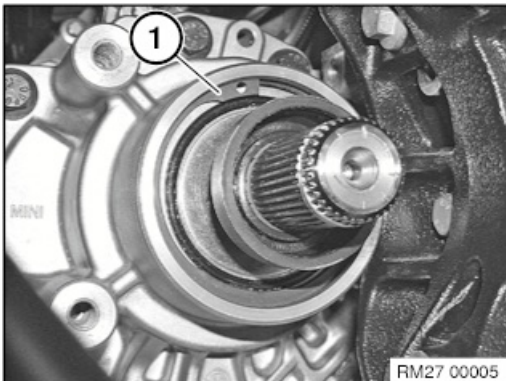


All-wheel drive vehicles with automatic transmission only:

Release screws (1).

Remove PTO mount.

Tightening torque 27 10 2AZ.

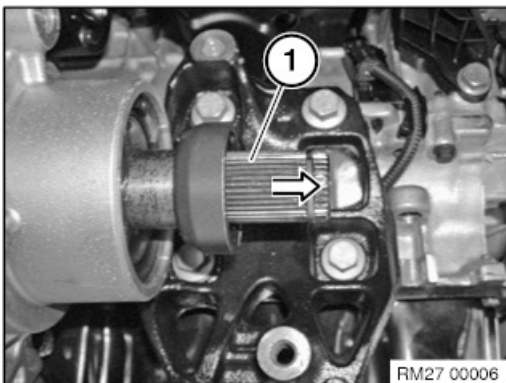


All-wheel drive vehicles with automatic transmission only:

Remove circlip (1).

Installation note:

Install retaining ring (1).



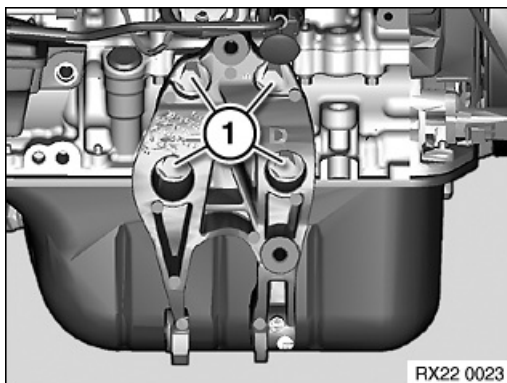
All-wheel drive vehicles with automatic transmission only:

Pull the connecting shaft (1) out of the PTO housing.

Note:

If the connecting shaft cannot be pulled out of the housing, see separate instructions for removing connecting shaft from PTO housing.





All:

Release screws.

Tightening torque 22 11 5AZ.

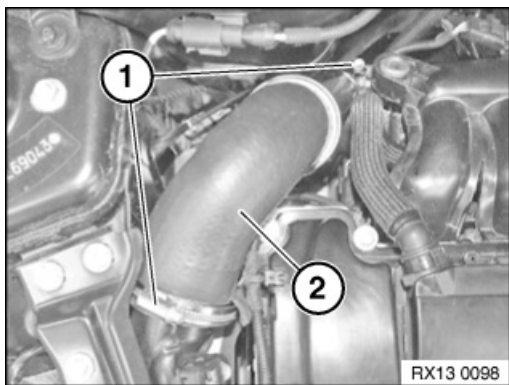
Note:

Graphic representation similar.



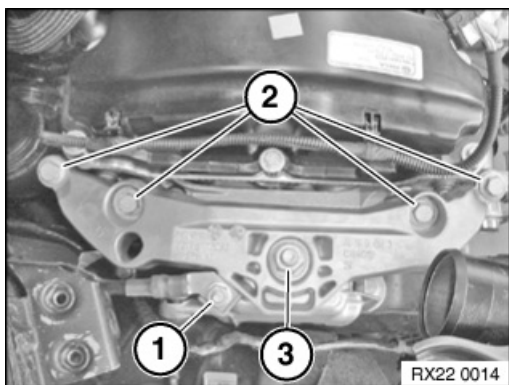
*Necessary preliminary work:*

- Remove right charge air duct
- Support engine / transmission with car jack



Release clamps (1) and detach charge air hose (2). *Installation note:* Install charge air hose (2) dry and free from grease.

Connecting branch on throttle valve must be dry and free from grease.



Release nut (1) and remove ground strap.

Tightening torque 22 11 7AZ.

Unfasten screws (2).

Tightening torque 22 11 2AZ.

Unscrew nut (3).

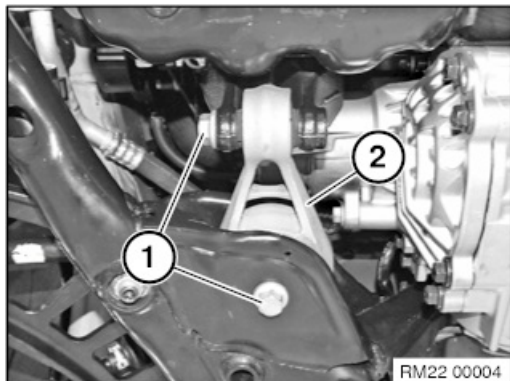
Tightening torque 22 11 1AZ.

Remove engine mounting bracket.



**Necessary preliminary work:**

- Remove underbody protection.

**Important!**

Support engine with transmission lifter.

Undo bolts (1) and remove bracket (2) with rubber mount.

Tightening torque 22 11 6AZ/9Az

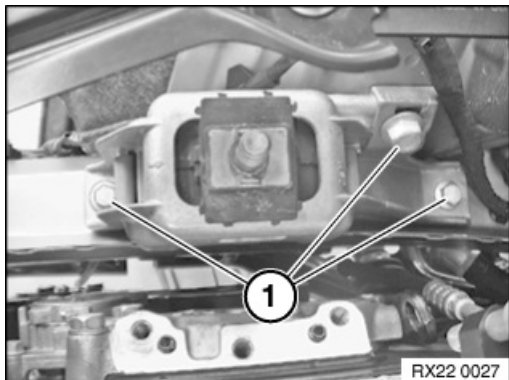


22 11 001 Replacing right engine mount



Necessary preliminary work:

- Remove right engine mounting bracket



Release screws (1).

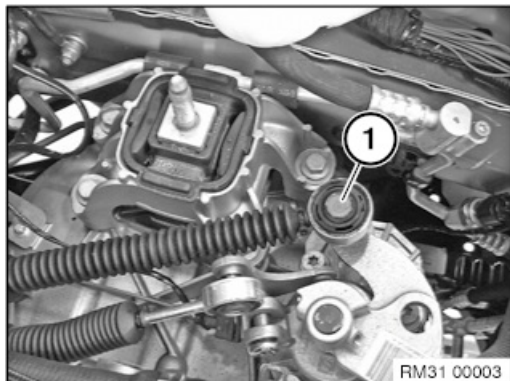
Tightening torque 22 11 4AZ.

Remove engine mount.

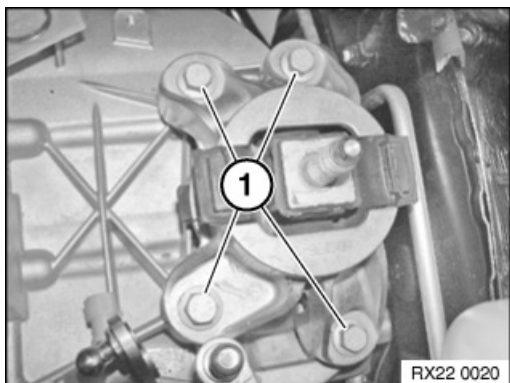


**Necessary preliminary work:**

- Remove transmission support bracket



Detach selector lever cable at ball joint (1).



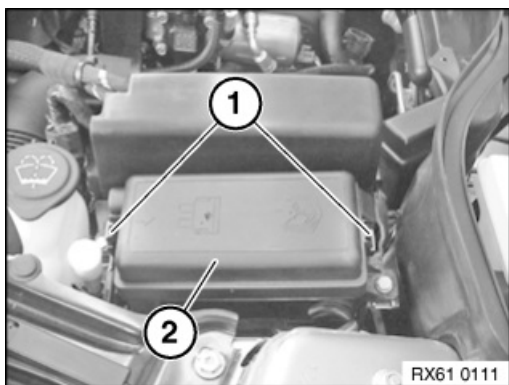
Release screws (1).

Tightening torque 22 32 1AZ.

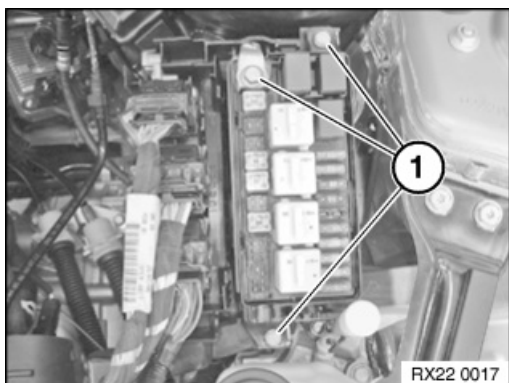


**Necessary preliminary work:**

- Clamp off battery
- Remove control unit
- Remove underbody protection
- Support engine / transmission with car jack



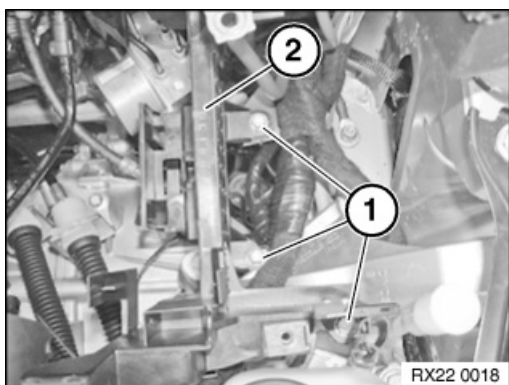
Unlock latch mechanisms (1) and remove fuse box cover (2).



Release screws (1).

Push fuse box to one side.

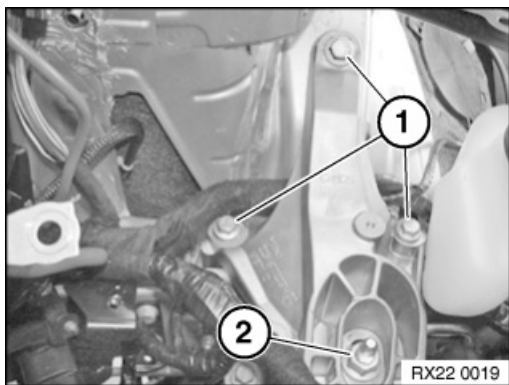
Tightening torque 61 13 1AZ.



Release screws (1).

Remove holder (2).





Release screws (1).

Important!

Screws M10 8.8 **must** be replaced by screws M10 10.9.

Tightening torque 22 32 2AZ.

Slacken nut (2).

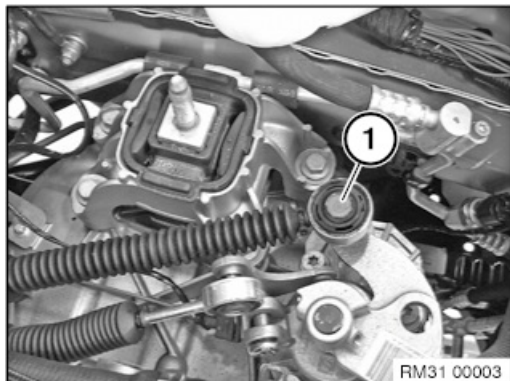
Tightening torque 22 32 3AZ.

Remove transmission support bracket.

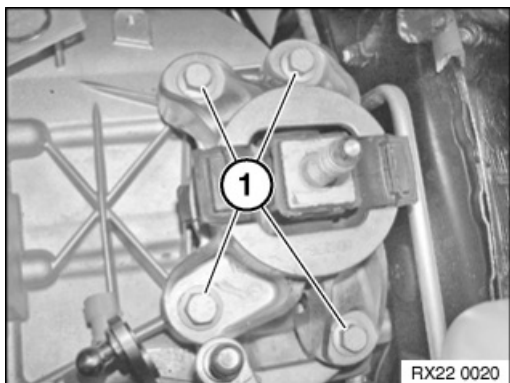


**Necessary preliminary work:**

- Remove transmission support bracket



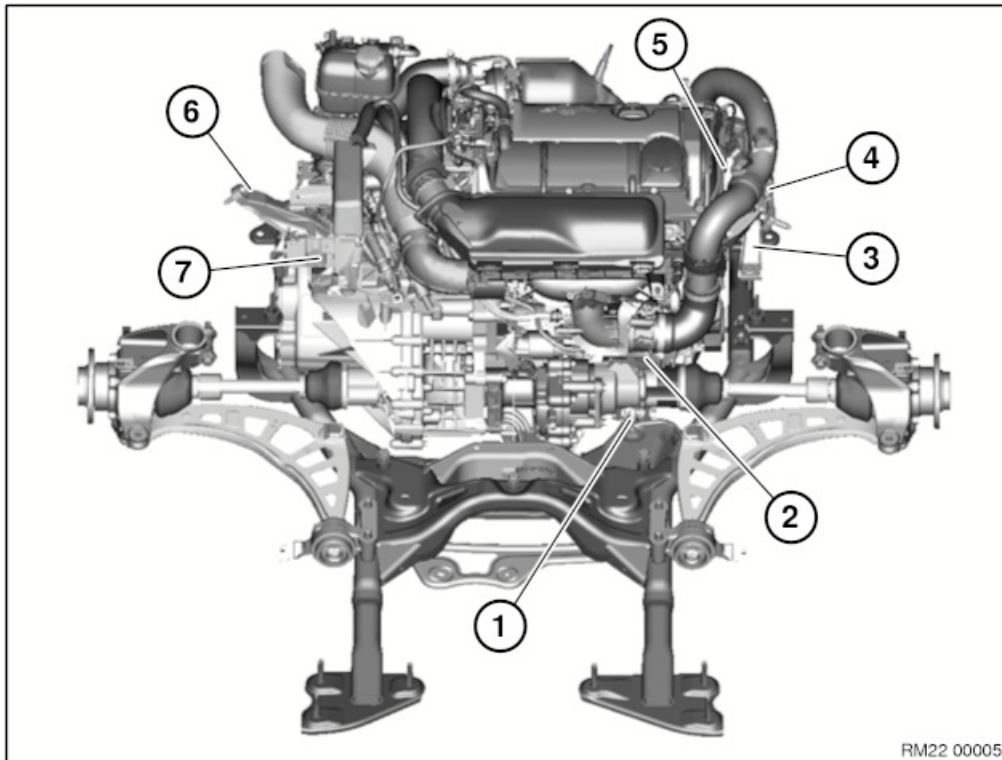
Detach selector lever cable at ball joint (1).



Release screws (1).

Tightening torque 22 32 1AZ.





Engine mounting:

- 1 Bracket with rubber mount
- 2 Bracket, engine block
- 3 Engine mount
- 4 Engine mounting bracket

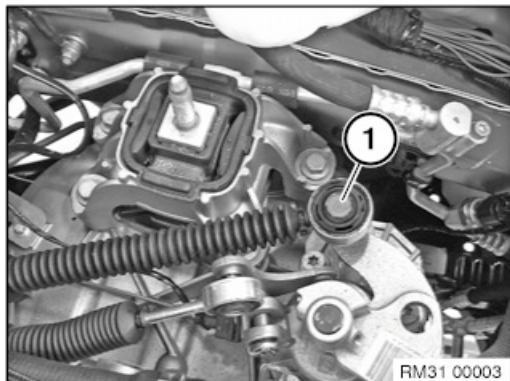
Gearbox mounting:

- 5 Adapter plate
- 6 Transmission support bracket
- 7 Rubber mount

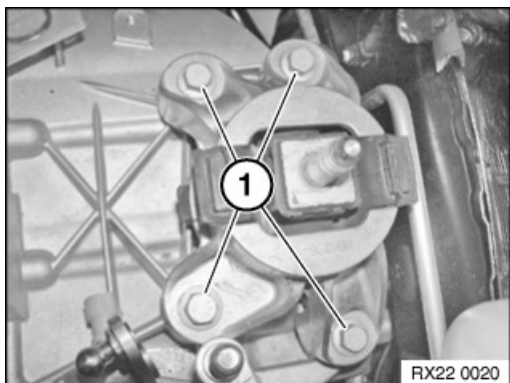


**Necessary preliminary work:**

- Remove transmission support bracket



Detach selector lever cable at ball joint (1).



Release screws (1).

Tightening torque 22 32 1AZ.



00 Danger of injury if oil comes into contact with eyes and skin



Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin



Protective measures/rules of conduct:

- Wear safety goggles.
- Wear oil-resistant protective gloves.
- Observe country-specific safety regulations.



First aid measures:

- Eye contact: Immediately rinse out eyes with lots of water and for at least 15 minutes. In the case that it is available, use an eye wash bottle. If eye irritation persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

Note: Do not use solvents/thinners.



**Danger of poisoning!**

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

**Protective measures/rules of conduct:**

- Fill oil in appropriately marked containers only.
- Do not pour oil in drinking vessels (beverage bottles, glasses or cups).
- Observe country-specific safety regulations.

**First aid measures:**

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.



**Caution!**

After completion of work, check transmission oil level.

The vehicle must be parked on a level surface in the 095workshop to check the transmission oil level.

Use only the approved transmission oil.

Failure to comply with this instruction will result in serious damage to the transmission.

**Recycling:**

Catch and dispose of escaping transmission oil.

Observe country-specific waste disposal regulations.

**Necessary preliminary work:**

- Drain gear oil at oil drain plug. Tightening torque: 23 00 1AZ
- Remove the transmission **(without wheel alignment!)**.
- If necessary, modify zero-gear sensor
- After installing the zero-gear sensor, it is necessary to teach in the position of the zero-gear sensor again
- The adjustment is performed using the "Service Function" of the BMW diagnosis system (learn/write the zero-gear sensor)



Reassemble the vehicle.

Check oil level.

The vehicle must be parked on a level surface in the 095workshop to check the transmission oil level.

Installation note:

Observe greasing specification.



**Caution!**

After completion of work, check transmission oil level.

The vehicle must be parked on a level surface in the workshop to check the transmission oil level.

Use only the approved transmission oil.

Failure to comply with this instruction will result in serious damage to the transmission.

**Recycling:**

Catch and dispose of escaping transmission oil.

Observe country-specific waste disposal regulations.

**Necessary preliminary work:**

- Drain gear oil at oil drain plug. Tightening torque: 23 00 1AZ.
- Remove the transmission **(without wheel alignment!)**.
- If necessary, modify zero-gear sensor
- After installing the zero-gear sensor, it is necessary to teach in the position of the zero-gear sensor again
- The adjustment is performed using the "Service Function" of the BMW diagnosis system (learn/write the zero-gear sensor)

**Reassemble the vehicle. Caution!**

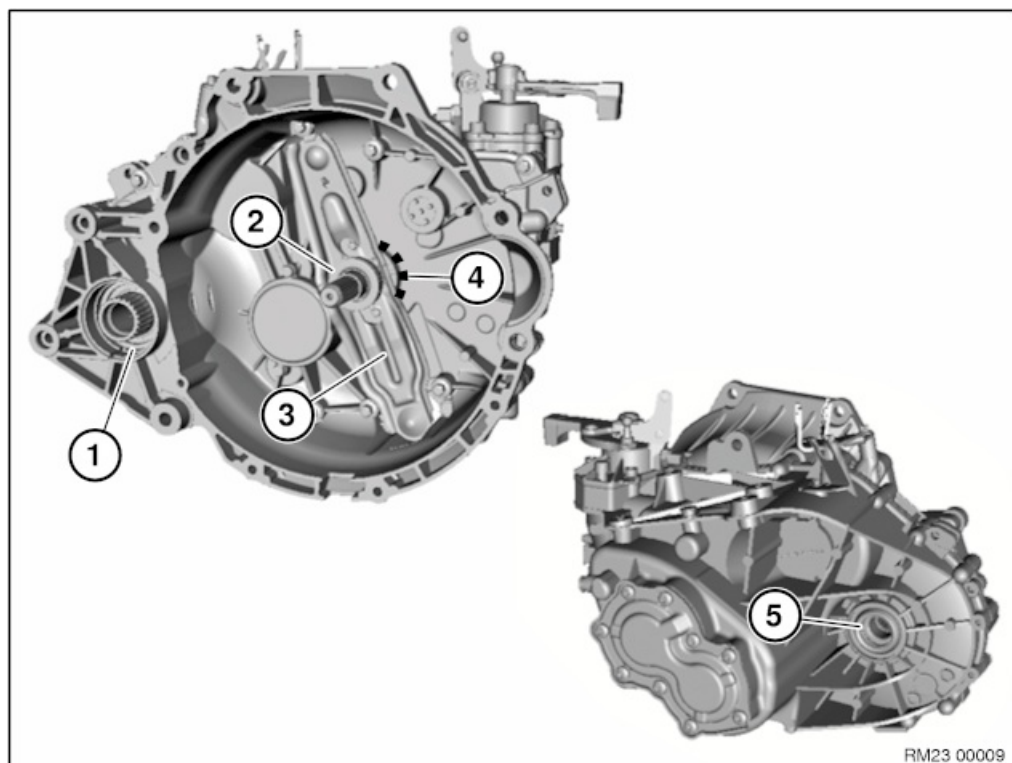
After completion of work, calibrate zero-gear sensor.

Check oil level.

The vehicle must be parked on a level surface in the workshop to check the transmission oil level.



23 00 ... Overview of gearbox housing (GS6X-53BG) all-wheel drive vehicle



Complete transmission, oil change, transmission designations

0 General information

Right

1 Radial shaft seal

2 Guide tube

3 Clutch operator

Drive shaft

4 Radial shaft seal

Left

5 Radial shaft seal



23 00 027 Removing and installing transmission (GS6X-53BG) all-wheel vehicle drive N18



Special tools required:

- 00 2 030
- 23 4 150



Necessary preliminary work:

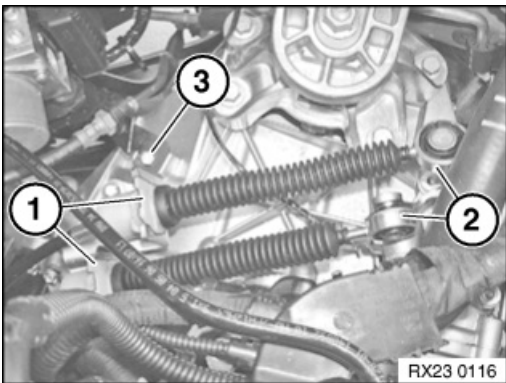
- Disconnect battery.
- Secure engine in installation position.
- Drain off transmission oil.
- Remove transmission support bracket
- Remove transmission mount.
- Remove front axle support.

No wheel alignment is required for removal and installation of front axle support.

- Remove transfer box.
- Remove left output shaft only at transmission end and hang up.

Important!

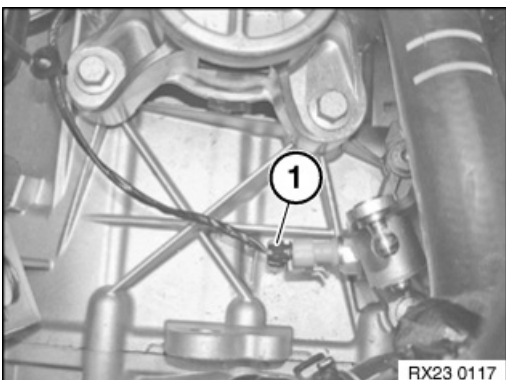
Bending the drive shaft by an excessive angle can cause premature damage to the joints/drive shaft!



Release clips on limit position/holder (1).

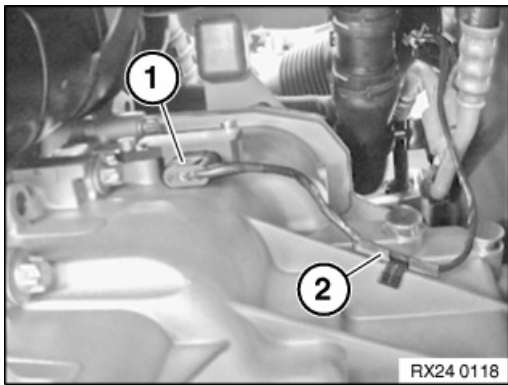
Detach selector lever cable (2) from ball joint.

Release screw (3) and remove bracket.

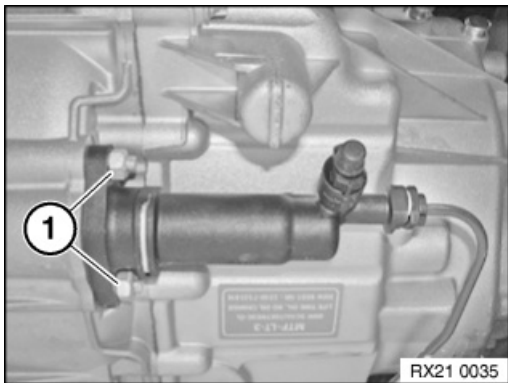


Disconnect plug (1) for reversing light switch.





Disconnect plug connection (1) on zero gear sensor.
Detach cable (2) with holder from transmission.



Note:
Pressure line of clutch slave cylinder remains connected.

Important!

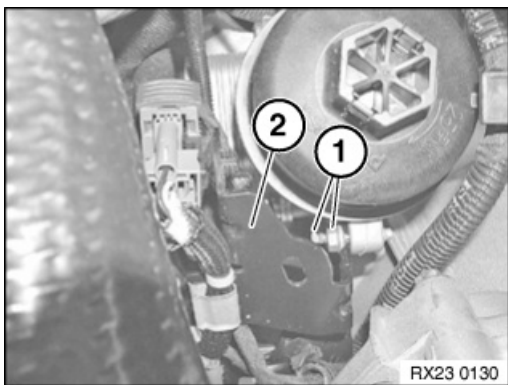
Slowly relieve tension on clutch slave cylinder otherwise air may be drawn in through sealing sleeve.

If possible, do not deflect push rod of clutch slave cylinder.

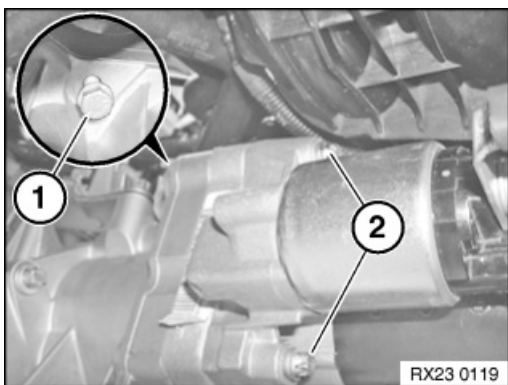
A deflection of the push rod caused by removal will cause easy escape of fluid. This escape of fluid does not mean that the clutch slave cylinder is damaged.

Replacement is therefore not necessary!

Release nuts (1) and remove clutch slave cylinder.
Tightening torque 21 52 2AZ.

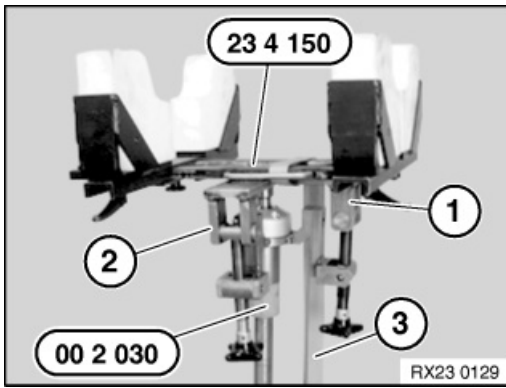


Release screws (1).
Release holder (2) from engine.



Undo starter bolt (1) SW13 from above.
Release bolts (2) and remove starter.
Tightening torque 12 41 1 AZ.





Supporting transmission:

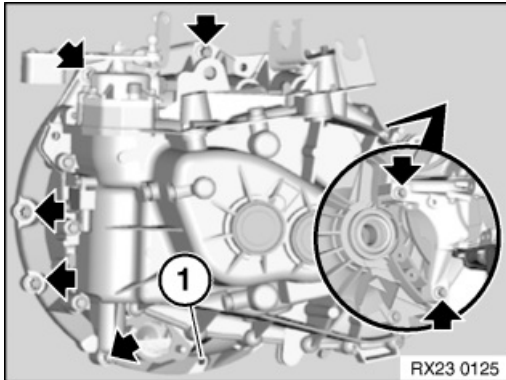
With special tools 23 4 150 and 00 2 030

Support transmission from underneath.

Secure transmission with tensioning strap (3).

Tasks are described in Transmission bracket.

After completion of work, check transmission fluid level.



Note:

A bracket is fitted at the lowest point (1) of the gearbox.

Release screws.

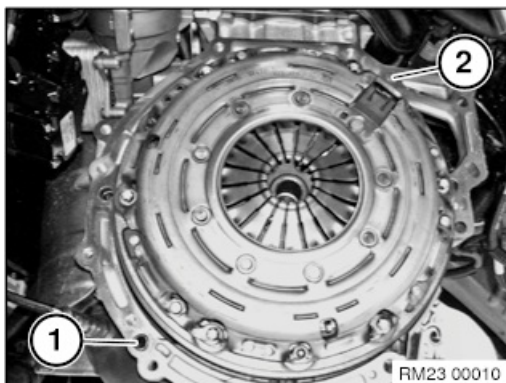
Remove gearbox

Tightening torque 23 00 1AZ.

Important!

Do not allow transmission to hang on transmission input shaft when removing and installing, as the clutch disc will be deformed.

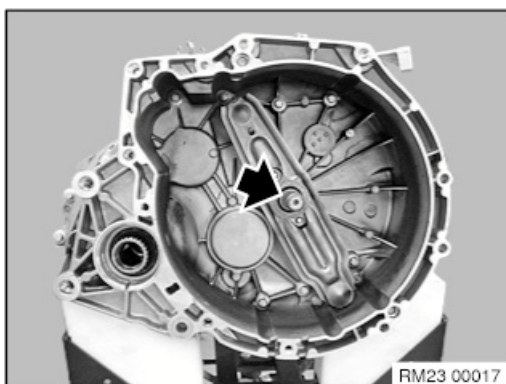
Pull out transmission and remove.



Installation note:

Check dowel sleeves (1) and (2) for correct seating.

Replace damaged fitting sleeves.



Installation note:

Remove grease from transmission input shaft and clean shaft.

Do **not** grease transmission input shaft.

Check clutch disc for friction rust in gearing and replace if necessary.





Installation note:

- If reusing the clutch:
Mechanically remove existing grease and lining abrasion from gearings of clutch disc (with a cloth).
Clean clutch hub and regrease.
In new clutch discs the gearing is already greased.
Refer to Service Operating Fluids
- Remove and clean release bearing and release lever
- Add transmission fluid.



**Warning!**

Danger of poisoning if oil is ingested/absorbed through the skin!

Risk of injury if oil comes into contact with eyes and skin!

**Recycling:**

Observe country-specific waste disposal regulations.

**Measures if oil is unintentionally released:**

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

Note: Do not flush oil away with water or aqueous cleaning agents.



23 ... Universal MINI transmission bracket



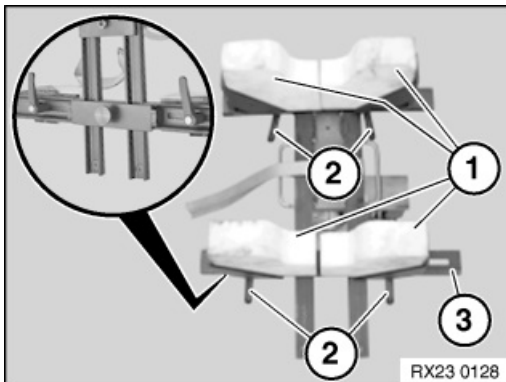
Special tools required:

- 00 2 030
- 23 4 150



Note:

- Suitable for manual and automatic transmissions

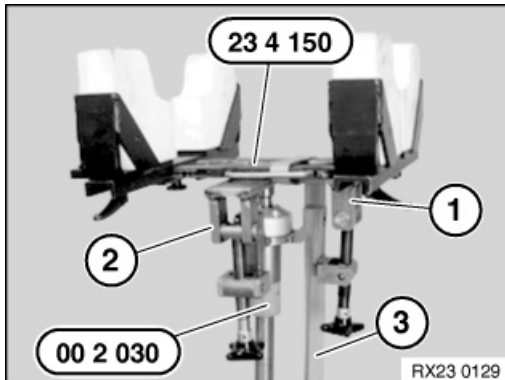


Important!

Supports (1) can be laterally adjusted by means of screws (2).

Carrier (3) of rear supports (1) can be longitudinally adjusted by means of screw.

Supports must be adapted in length and width to the transmission.



Supporting transmission:

Support transmission with special tools 23 4 150 , 00 2 030 .

Joint (1) for height adjustment.

Joint (2) for inclination angle adjustment.

Important!

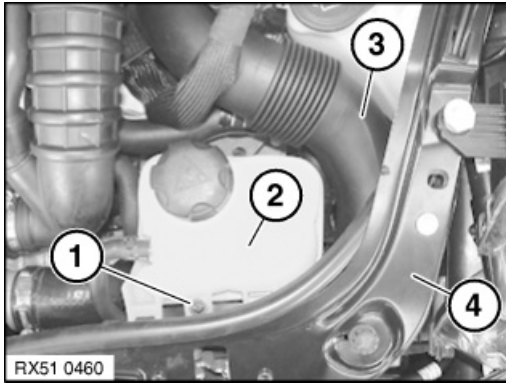
Transmission **must** be secured with tensioning strap (3).



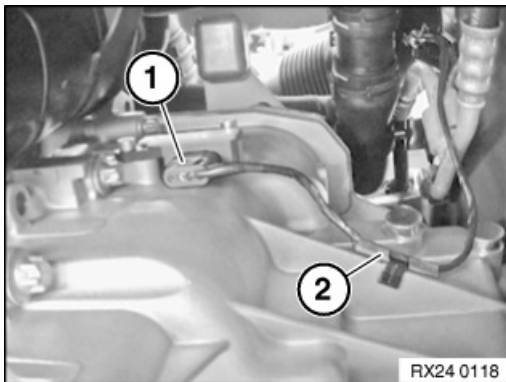
**Important!**

After installing the zero-gear sensor, it is necessary to teach in the position of the zero-gear sensor again.

The adjustment is performed using the "Service Function" of the BMW diagnosis system (learn/write the zero-gear sensor).

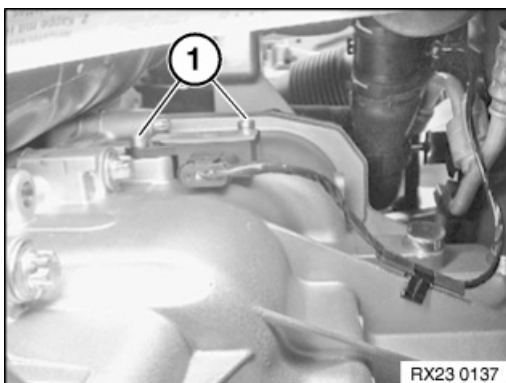


Undo bolt (1) and place coolant expansion tank (2) to one side.
(do not drain off coolant)



View from below.

Disconnect plug connection (1) on zero-gear sensor.



Release screws (1).

Remove zero gear sensor.

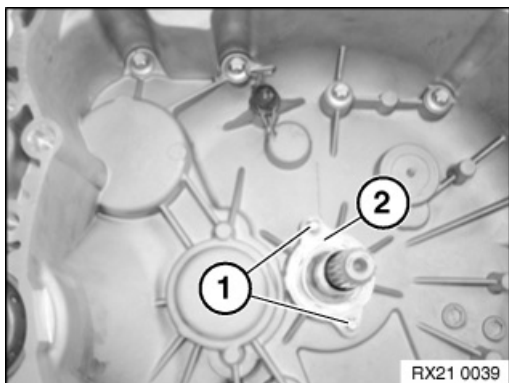
Tightening torque 23 14 2AZ.





Necessary preliminary work:

- Remove gearbox
- Remove clutch operator and release lever from guide tube.



Release screws (1).

Remove guide tube (2).

Installation note:

Replace screws.

Clean new guide tube.

Guide surface must be clean (no labels/stickers or residual adhesive, etc.).



23 11 201 Replacing left radial shaft seal on differential (GS6X-53BG/DG) all-wheel drive vehicle



Special tools required:

- 23 0 120
- 23 0 370



Caution!

After completion of work, check transmission oil level.

The vehicle must be parked on a level surface in the workshop to check the transmission oil level.

Use only the approved transmission oil.

Failure to comply with this instruction will result in serious damage to the transmission.



Recycling:

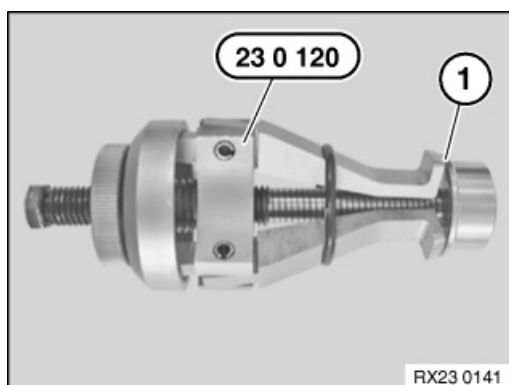
Catch and dispose of escaping transmission oil.

Observe country-specific waste disposal regulations.



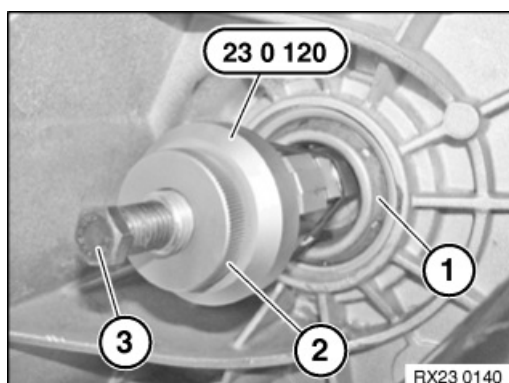
Necessary preliminary work:

- Remove left axle shaft



Prepare special tool 23 0 120 :

Distance (1) < 1 mm.

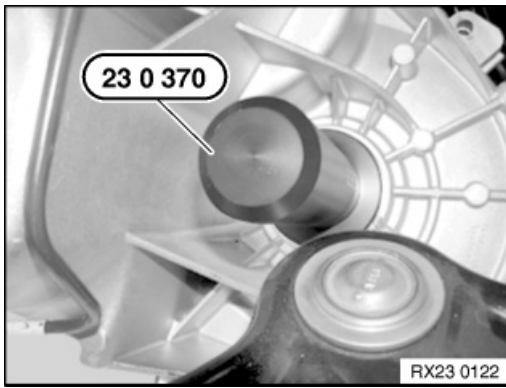


Insert special tool 23 0 120 into radial shaft seal until limit position. Turn nut (2) to expand retaining claws. Then insert screw (3) and pull off radial shaft seal. **Caution!**

Risk of damage:

Damage to the gearbox housing will result in oil leaks!





Installation note:

Coat sealing lips of radial shaft seal with transmission oil.

Drive radial shaft seal with special tool 23 0 370 into the transmission housing until sealing ring is flush with differential.

Push drive shaft over resistance of snap ring. The drive shaft must snap audibly into place.

Check transmission oil level and check for leaks.

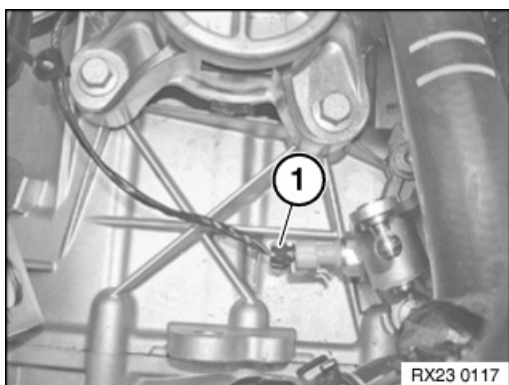


23 14 ... Replacing reversing light switch



Necessary preliminary tasks:

- Remove intake silencer housing (only N16)
- Remove intake neck for intake filter housing (only N18)
- Remove intake silencer housing and charge air pipe (only N47)



Disconnect plug connection (1) on reverse gear switch.

Remove reverse gear switch.

Tightening torque 23 14 1AZ.

Note:

Graphic similar



23 11 211 Replacing right radial shaft seal on differential (GS6X-53BG/DG) all-wheel drive vehicle



Special tools required:

- 23 0 420
- 23 0 340



Caution!

After completion of work, check transmission oil level.

The vehicle must be parked on a level surface in the workshop to check the transmission oil level.

Use only the approved transmission oil.

Failure to comply with this instruction will result in serious damage to the transmission.



Recycling:

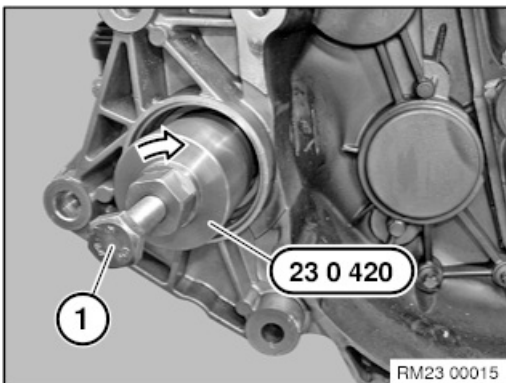
Catch and dispose of escaping transmission oil.

Observe country-specific waste disposal regulations.



Necessary preliminary work:

- Remove transfer box (PTO)



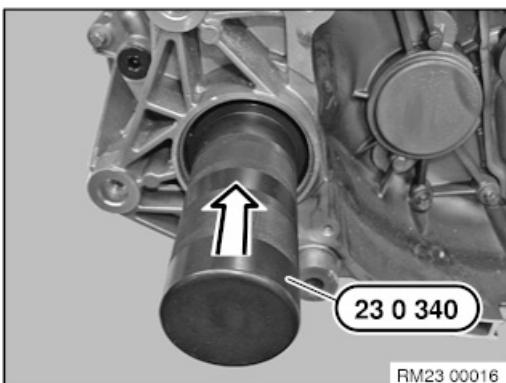
Screw special tool 23 0 420 into radial shaft seal.

Screw in bolt (1) and pull out radial shaft seal.

Caution!

Risk of damage:

Damage to the gearbox housing will result in oil leaks!



Installation note:

Coat sealing lips of new radial shaft seal with clean transmission oil.

Using special tool 23 0 340, drive radial shaft seal into housing.

Check transmission oil level and check for leaks.





*Note:*

After completion of work, check gearbox oil level.

Important!

Use only the approved transmission oil.

Failure to comply with this requirement will result in serious damage to the manual gearbox.

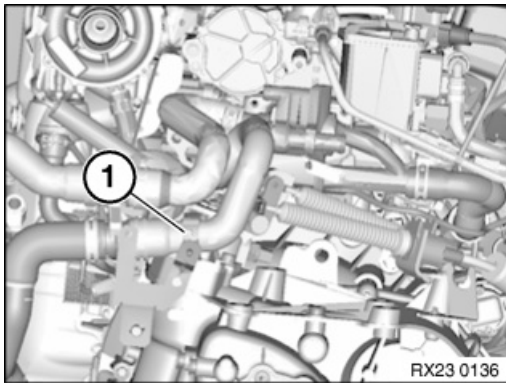
*Installation note:*

After installing the shifting unit, it is necessary to teach in the position of the zero-gear sensor again.

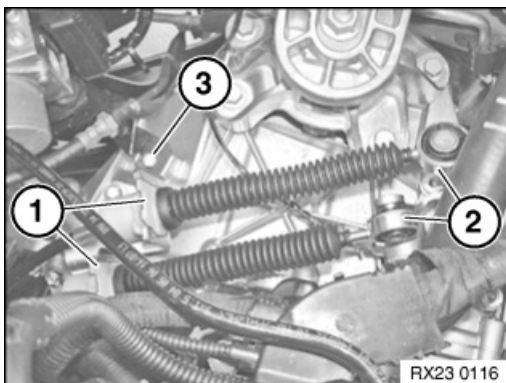
The adjustment is performed using the "Service Function" of the BMW diagnosis system (learn/write the zero-gear sensor).

**Necessary preliminary tasks:**

- Remove intake silencer housing (N16)
- Remove intake neck for intake filter housing (N18)
- Release coolant expansion tank and place to one side
- Remove intake silencer housing and charge air pipe (only N47)



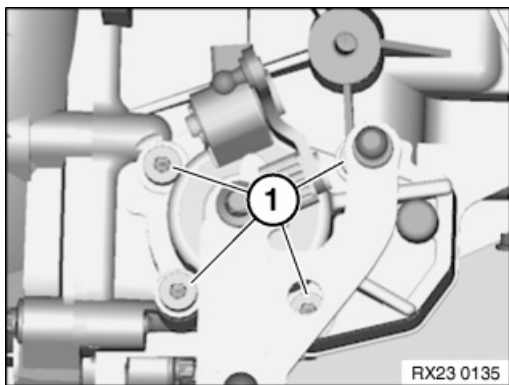
Remove coolant hose from bracket (1).



Release clips on stop/holder (1).

Detach selector lever cables (2) at ball joints.





Release screws (1).

Tightening torque 23 41 1AZ

Pull shifting unit up and out of transmission.

Note installation position.

Installation note:

Clean thread pitches.

Replace microencapsulated screws.

Apply Loctite 5203 sealing compound.



**Special tools required:**

- 23 0 380
- 23 0 490

**Note:**

After completion of work, check transmission oil level.

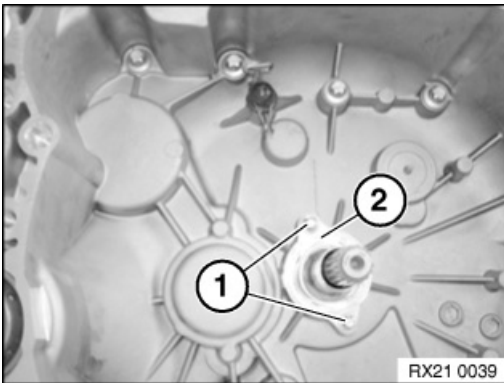
The vehicle must be parked on a level surface in the workshop to check the transmission oil level.

Use only the approved transmission oil.

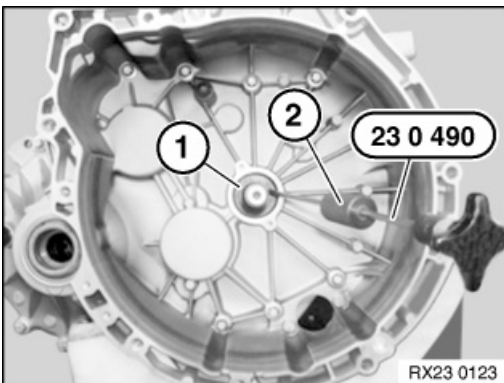
Failure to comply with this requirement will result in serious damage to the manual gearbox!

**Necessary preliminary work:**

- Remove transmission
- Remove release bearing



Release bolts (1) and remove guide tube (2).



Drive a hole into radial shaft seal (1) using a centre punch.

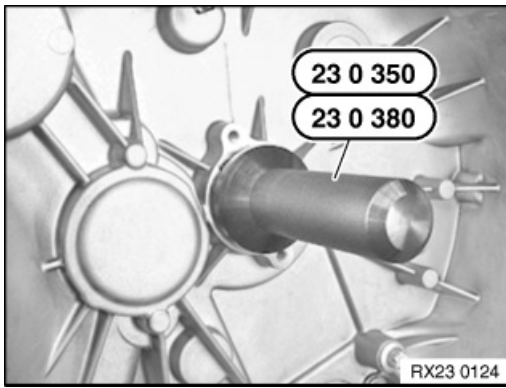
Caution!

Do not use a drill as drillings may result in transmission malfunction.

Screw in special tool 23 0 490 .

Drive out radial shaft seal (1) with impact weight (2).





Installation note:

Coat sealing lips of radial shaft seal with transmission oil.

Push the radial shaft seal onto the special tool 23 0 380 and drive it to the limit position.

Check transmission oil level and check for leaks.



23 11 Transmission designations

Breakdown of MINI designation:

Manual gearbox:

GS5-65 BH/SH		
G	Transmission	
S	Transmission type	<ul style="list-style-type: none"> S = Manual gearbox A = Automatic transmission
5	Number of forward gears	
65		<ul style="list-style-type: none"> Manufacturer's code number
B	Gear set	<ul style="list-style-type: none"> B = Petrol gear ratio D = Diesel gear ratio
H	Code letter of transmission manufacturer	<ul style="list-style-type: none"> H = Midland G = Getrag Z = ZF (Zahnradfabrik Friedrichshafen)

Automatic transmission:

GACVT 16Z (CVT) Automatic		
G	Transmission	
A	Transmission type	<ul style="list-style-type: none"> S = Manual gearbox A = Automatic transmission
CVT		Electronically controlled continuously variable automatic transmission
16		<ul style="list-style-type: none"> Manufacturer's code number
Z	Code letter of transmission manufacturer	<ul style="list-style-type: none"> Z = ZF (Zahnradfabrik Friedrichshafen)

GA6F21 WA Automatic		
G	Transmission	
A	Transmission type	<ul style="list-style-type: none"> S = Manual gearbox A = Automatic transmission
6	Number of forward gears	
F21		<ul style="list-style-type: none"> Manufacturer's code number
WA	Code letter of transmission manufacturer	<ul style="list-style-type: none"> A = AISIN FT= AISIN model revision



Manual gearbox:

MINI designation	Manufacturer	Manufacturer designation	Remarks
GS5-65 BH	Midland	R65	R50
GS6--85DG	Getrag	G285D	R50
GS6--85BG	Getrag	G285	R52/R53
GS5-52 BG	Getrag	G252	R50/52
GS6--53BG	Getrag	G253	R55/R56/R57/R58/R60/R61 - N14,N16,N18 engine
GS6-55 BG	Getrag	G255	R55/R56/R57/R58/R60/R61 - N12,N16 engine
GS6--53DG	Getrag	G253	R55/R56 - W16 engine
GS6--53DG	Getrag	G253	R55/R56/R57/R58/R60/R61 - N47 engine
GS6--58BG	Getrag	G220	F56-B38
GS6-59SG/DG	Getrag	G350	F56-B37/B48
GS6-60DA/BA	AISIN	BG6	F54/F60-B36/B38/B46/B47/B48
7DCT300	Getrag	7DCT	F54/F60-B36/B37/B38/B46/B48

Automatic transmission:

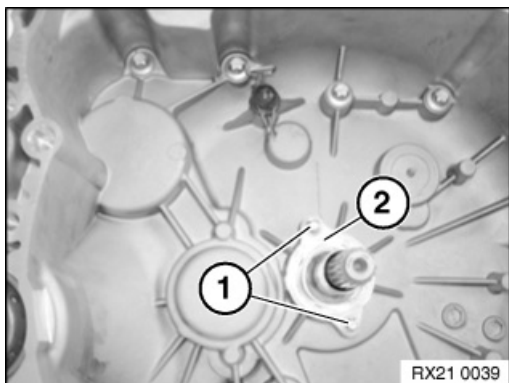
MINI designation	Manufacturer	Manufacturer designation	Remarks
GA CVT 16Z	ZF	ECVT	R52
GA 6F21 WA	AISIN	F21	R52/53/R55/R56/R57/R58/R60/R61
GA 6F21 FT	AISIN	F21 model revision	F56-B37/B38/B48
GA 8F22 FRUs	AISIN	GA8F22AW	
GA 8G45	AISIN	8G45	





Necessary preliminary work:

- Remove gearbox
- Remove clutch operator and release lever from guide tube.



Release screws (1).

Remove guide tube (2).

Installation note:

Replace screws.

Clean new guide tube.

Guide surface must be clean (no labels/stickers or residual adhesive, etc.).



**Special tools required:**

- 23 0 380
- 23 0 490

**Note:**

After completion of work, check transmission oil level.

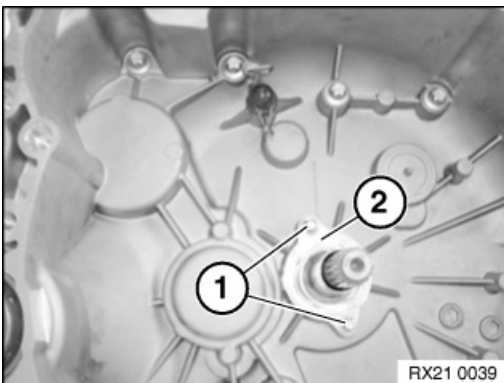
The vehicle must be parked on a level surface in the workshop to check the transmission oil level.

Use only the approved transmission oil.

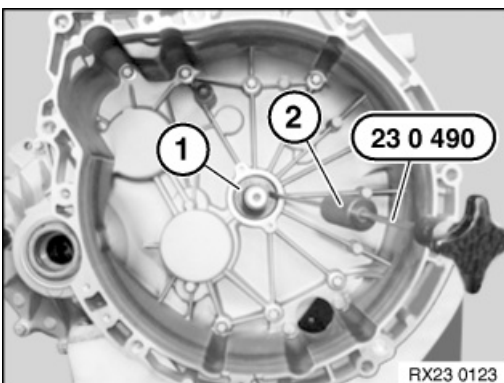
Failure to comply with this requirement will result in serious damage to the manual gearbox!

**Necessary preliminary work:**

- Remove transmission
- Remove release bearing



Release bolts (1) and remove guide tube (2).



Drive a hole into radial shaft seal (1) using a centre punch.

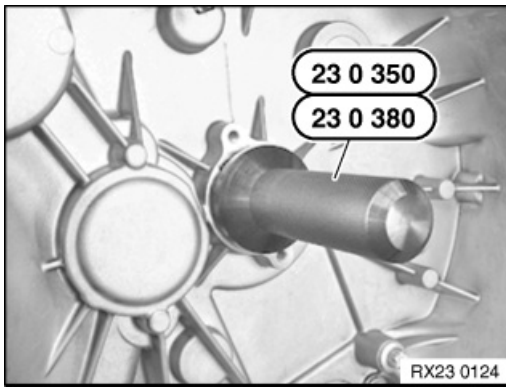
Caution!

Do not use a drill as drillings may result in transmission malfunction.

Screw in special tool 23 0 490 .

Drive out radial shaft seal (1) with impact weight (2).





Installation note:

Coat sealing lips of radial shaft seal with transmission oil.

Push the radial shaft seal onto the special tool 23 0 380 and drive it to the limit position.

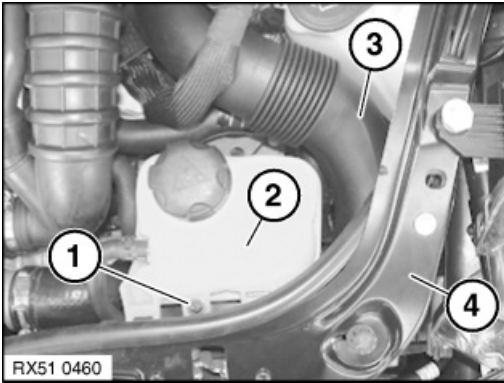
Check transmission oil level and check for leaks.



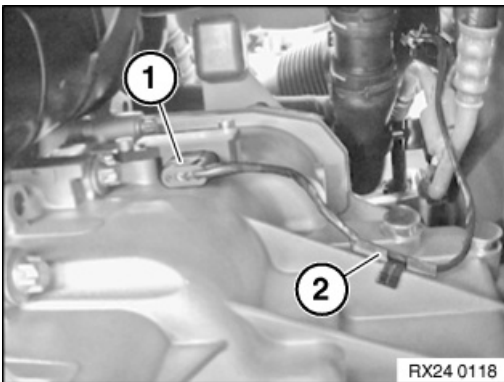
**Important!**

After installing the zero-gear sensor, it is necessary to teach in the position of the zero-gear sensor again.

The adjustment is performed using the "Service Function" of the BMW diagnosis system (learn/write the zero-gear sensor).

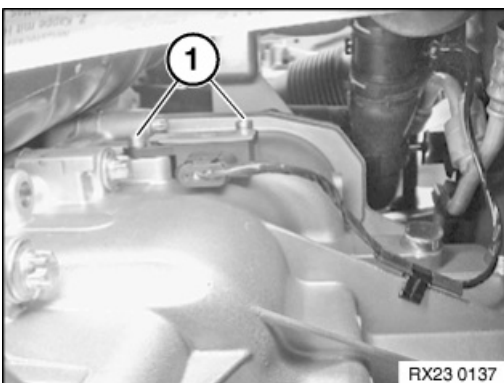


Undo bolt (1) and place coolant expansion tank (2) to one side.
(do not drain off coolant)



View from below.

Disconnect plug connection (1) on zero-gear sensor.



Release screws (1).

Remove zero gear sensor.

Tightening torque 23 14 2AZ.

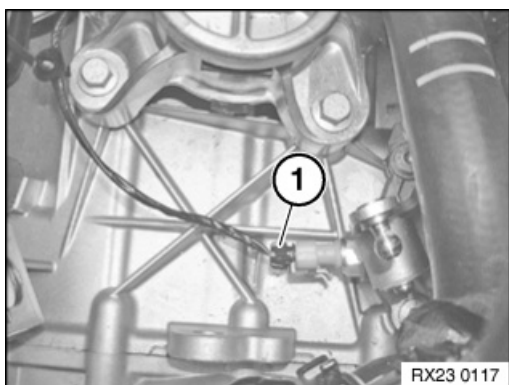


23 14 ... Replacing reversing light switch



Necessary preliminary tasks:

- Remove intake silencer housing (only N16)
- Remove intake neck for intake filter housing (only N18)
- Remove intake silencer housing and charge air pipe (only N47)



Disconnect plug connection (1) on reverse gear switch.

Remove reverse gear switch.

Tightening torque 23 14 1AZ.

Note:

Graphic similar



**Recycling:**

Catch and dispose of escaping transmission oil.

Observe country-specific waste disposal regulations

**Note:**

Gearbox is at normal operation temperature.

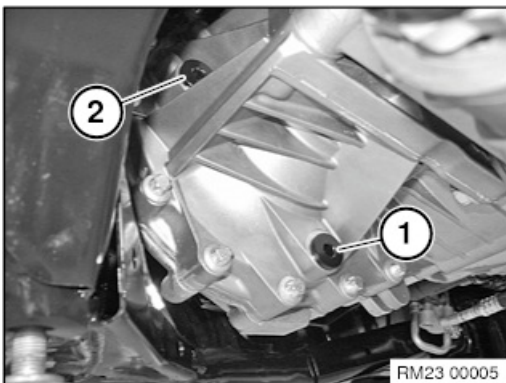
Important!

Use only the approved transmission oil.

Failure to comply with this instruction will result in serious damage to the transmission.

Capacity, refer to MINI Operating Fluids.

The vehicle must be parked on a level surface in the workshop to fill the transmission with oil.



Unscrew oil drain plug (1) and allow oil to flow out completely.

Clean oil drain plug and reinstall.

Tightening torque 23 00 1AZ.

Unscrew filler/fluid level monitoring connector (2) and fill gearbox until oil overflows. Allow excess oil to drain and reinstall filler/fluid level monitoring connector.

Tightening torque 23 00 1AZ.



23 ... Universal MINI transmission bracket



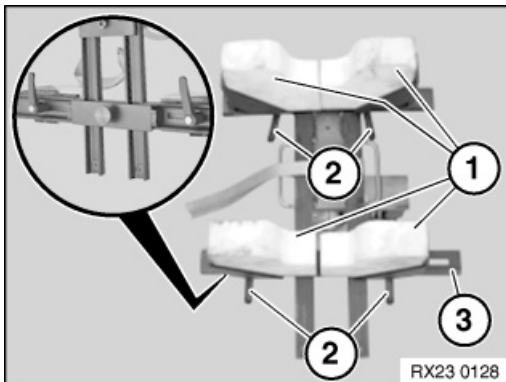
Special tools required:

- 00 2 030
- 23 4 150



Note:

- Suitable for manual and automatic transmissions

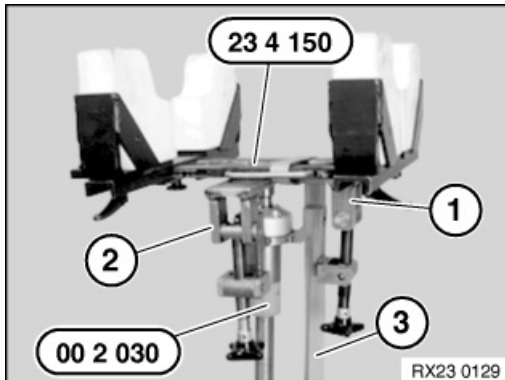


Important!

Supports (1) can be laterally adjusted by means of screws (2).

Carrier (3) of rear supports (1) can be longitudinally adjusted by means of screw.

Supports must be adapted in length and width to the transmission.



Supporting transmission:

Support transmission with special tools 23 4 150 , 00 2 030 .

Joint (1) for height adjustment.

Joint (2) for inclination angle adjustment.

Important!

Transmission **must** be secured with tensioning strap (3).



00 Danger of injury if oil comes into contact with eyes and skin



Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin



Protective measures/rules of conduct:

- Wear safety goggles.
- Wear oil-resistant protective gloves.
- Observe country-specific safety regulations.



First aid measures:

- Eye contact: Immediately rinse out eyes with lots of water and for at least 15 minutes. In the case that it is available, use an eye wash bottle. If eye irritation persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

Note: Do not use solvents/thinners.



**Danger of poisoning!**

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

**Protective measures/rules of conduct:**

- Fill oil in appropriately marked containers only.
- Do not pour oil in drinking vessels (beverage bottles, glasses or cups).
- Observe country-specific safety regulations.

**First aid measures:**

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.



**Important!**

Transmissions are filled with fluid. Oil level does not have to be compensated!

Only in the event of discernible external damage to exchange transmission or discernible oil leakage from exchange transmission - check oil level.

After completing work:

- Use only the approved automatic transmission fluid.
- Reset adaptation values.
- Perform clutch and gear ratio adaptation.

Failure to comply with this requirement will result in serious damage to the automatic transmission!

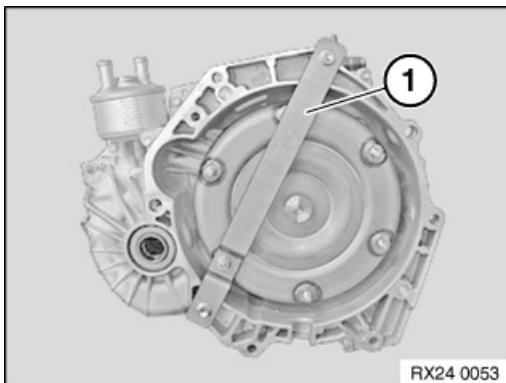
**Recycling:**

Catch and dispose of escaping transmission oil.

Observe country-specific waste disposal regulations

**Necessary preliminary tasks:**

- Remove automatic transmission (**without wheel alignment!**).



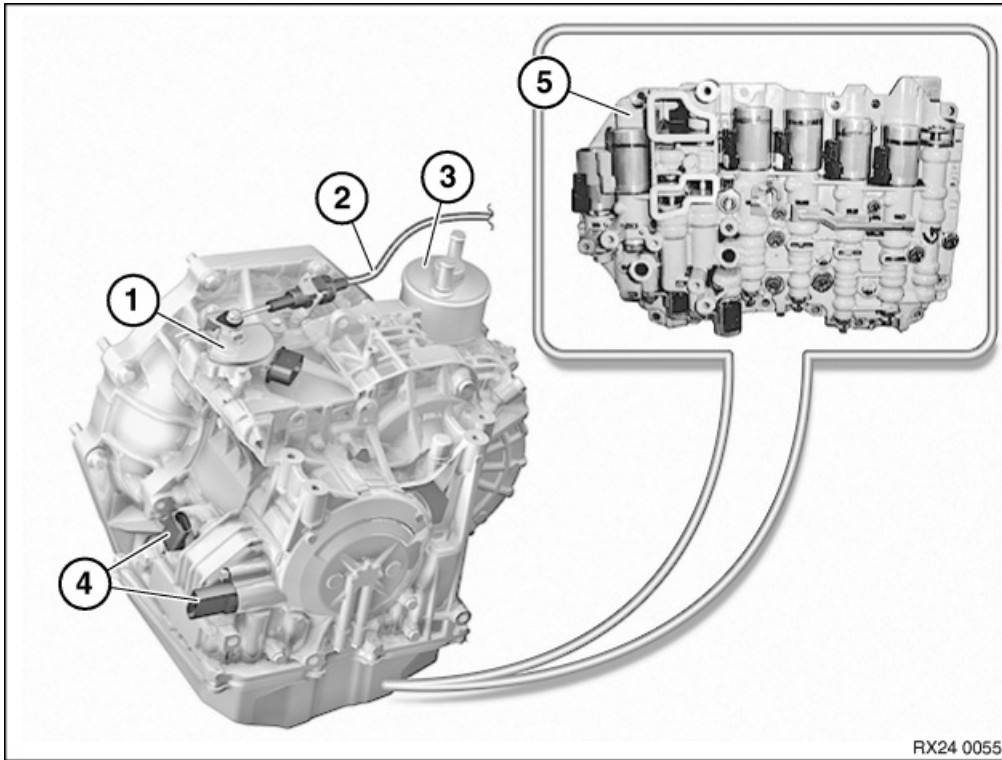
Convert following components from previous transmission to new transmission.

- Converter, transportation retainer (1).
- Holder with retaining clips for wiring harness
- Modify ventilation pipe
- Transportation plate
- Transmission carrier with transmission support block

Tightening torque 24 11 9AZ.



24 00 ... Overview of transmission housing (AISIN)



Note: Graphic similar.

- 1 Gear position switch 2 Bowden cable to the selector lever
- 3 Transmission oil cooler 4 EGS control unit multiple pin connector
- 5 Hydraulic shift unit



**Special tools required:**

- 00 2 030
- 23 4 150

**Note:**

After completion of work, check transmission oil level.

**Important!**

Use only the approved automatic transmission oil in this automatic transmission.

Failure to comply with this requirement will result in serious damage to the automatic transmission!

Important!

An incorrectly adjusted gearshift mechanism can result in gear tooth meshing noises being transmitted to the passenger compartment.

Adjust selector lever.

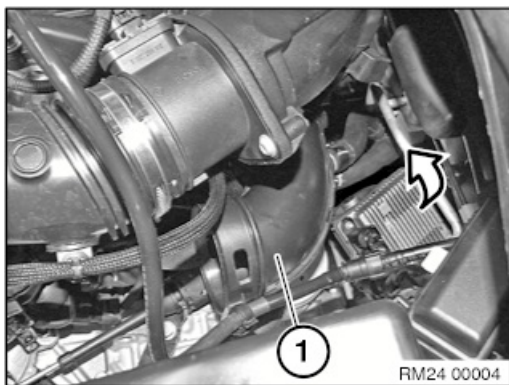
**Necessary preliminary tasks:**

- Switch off ignition.
- Clamp off battery.
- Remove intake pipe for intake silencer housing (N18).
- Remove intake silencer housing (N16).
- Drain coolant.
- Secure engine in installation position.
- Remove front axle support.

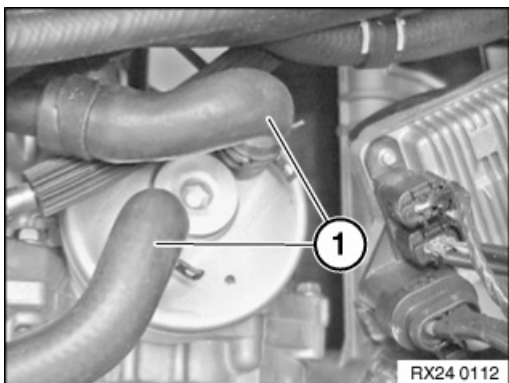
No wheel alignment is required for removal and installation of front axle support.

- Remove starter motor.
- Remove rubber mounts for gearbox mounting.
- Remove left output shaft.
- Remove right output shaft.
- Disconnect propeller shaft at transfer box, release centre mount.
- Tie up propeller shaft to underbody.
- **Important:**
- Bending the propeller shaft by an excessive angle can cause premature damage to the joint/propeller shaft!
- Remove PTO.



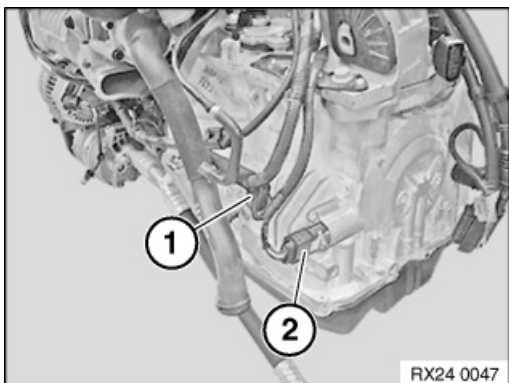


Turn the N18: intake pipe (1) counterclockwise and remove.



Unfasten hose clamps.

Disconnect coolant hoses (1) from oil cooler.



Disconnect multiple pin connectors (1/2) of EGS control unit.

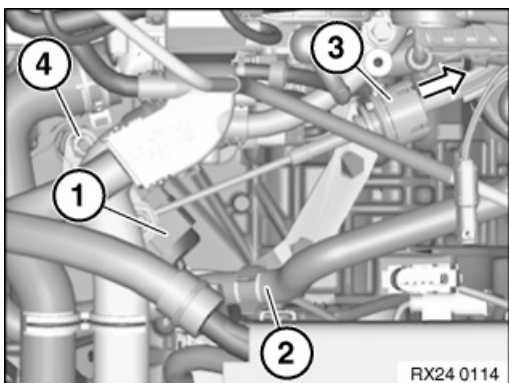
Remove wiring harness.

Pay attention to routing of wiring harness.

Note:

Graphic similar.

Engine shown removed.



Disconnect plug connector (1) from gear position switch.

Remove hose (2) from holder.

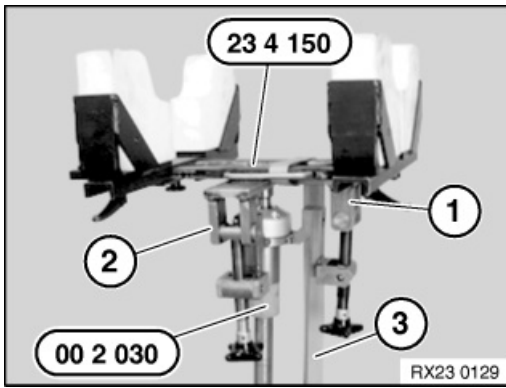
Slide cable retaining sleeve (3) in direction of arrow.

Remove cable upwards from holder.

Slacken nut (4).

Tightening torque 24 11 6AZ.



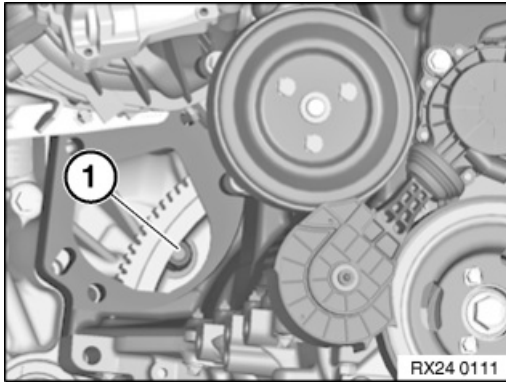


Supporting transmission:

Support gearbox with special tool 23 4 150 and 00 2 030 .

Secure transmission with tensioning strap (3).

Tasks are described in gearbox holder.

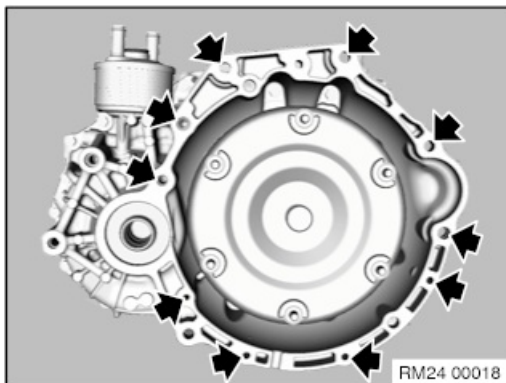


Release nut (1) through opening for starter.

Crank engine further and release remaining 5 nuts.

Screw connection, converter:

Tightening torque 24 11 21AZ.



Release bolts and remove transmission.

Important!

Transmission mounting bolts differ in length.

Note installation position.

Installing the wrong bolts may cause serious damage.

Tightening torque 24 11 4AZ.

Installation note:

Check that fitting sleeves are correctly fitted.

Replace damaged fitting sleeves.



**Warning!**

Danger of poisoning if oil is ingested/absorbed through the skin!

Risk of injury if oil comes into contact with eyes and skin!

**Recycling:**

Observe country-specific waste disposal regulations.

**Measures if oil is unintentionally released:**

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

Note: Do not flush oil away with water or aqueous cleaning agents.



23 ... Universal MINI transmission bracket



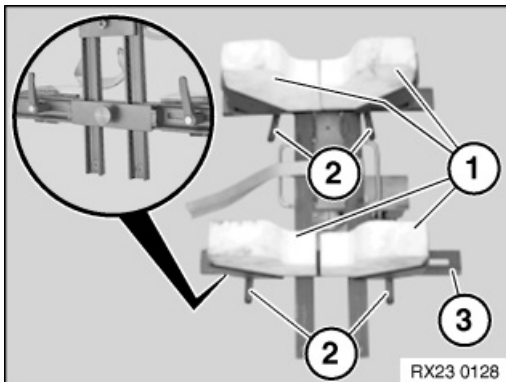
Special tools required:

- 00 2 030
- 23 4 150



Note:

- Suitable for manual and automatic transmissions

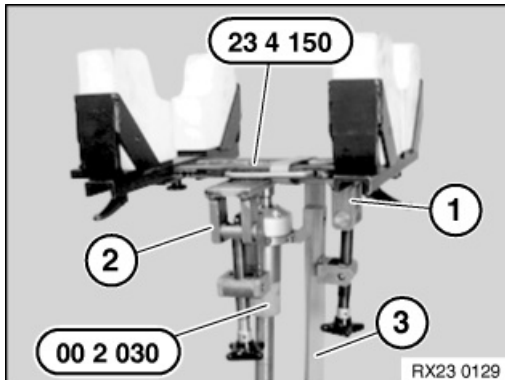


Important!

Supports (1) can be laterally adjusted by means of screws (2).

Carrier (3) of rear supports (1) can be longitudinally adjusted by means of screw.

Supports must be adapted in length and width to the transmission.



Supporting transmission:

Support transmission with special tools 23 4 150 , 00 2 030 .

Joint (1) for height adjustment.

Joint (2) for inclination angle adjustment.

Important!

Transmission **must** be secured with tensioning strap (3).



**Important!**

After completion of work, check transmission oil level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 litres.

**Important!**

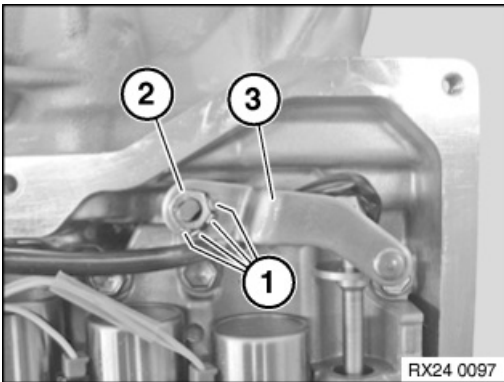
Use only the approved automatic transmission oil in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain oil before the transmission has cooled down.

**Necessary preliminary tasks:**

- Remove transmission oil sump
- Remove transmission oil strainer

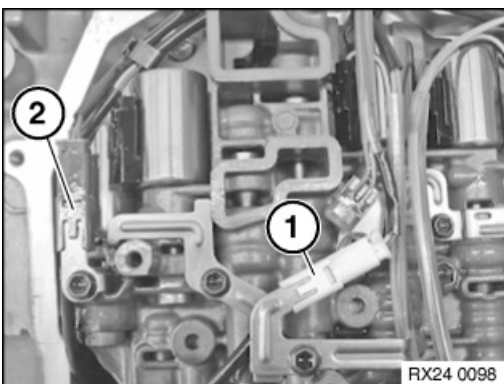


Bend open retaining lugs (1) of hand valve lever.

Slacken nut (2).

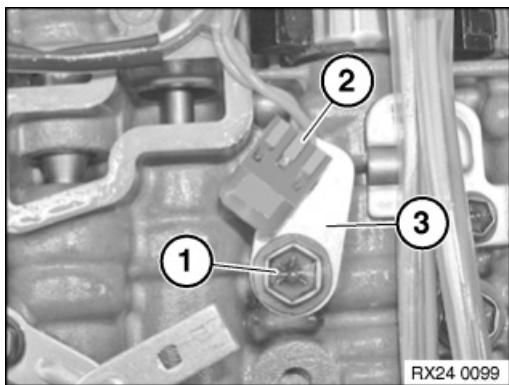
Tightening torque: 24 11 17AZ.

Remove hand valve lever (3).



Release connectors (1/2) from holders and disconnect.





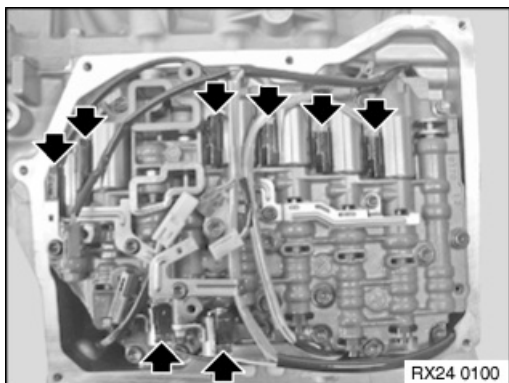
Release screw (1).

Tightening torque: 24 11 17AZ.

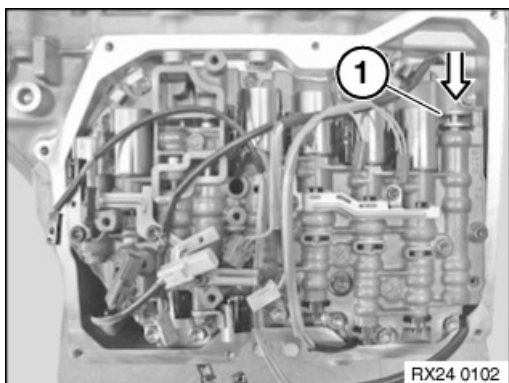
Remove oil temperature sensor (2) with locking plate (3).

Installation note:

Moisten seal with ATF.

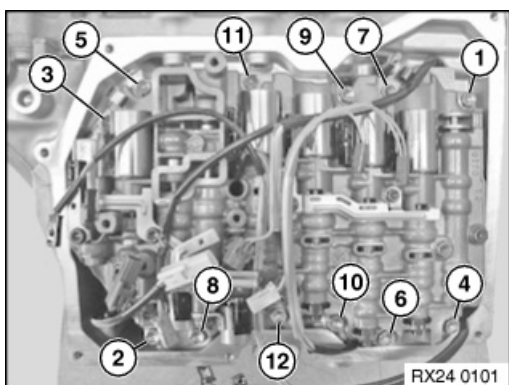


Disconnect plugs of magnet and pressure valves. *Installation note:*
Pay attention to routing of cables.



Important!

When removing selector unit, slide in gear selector valve (1) and hold down.



Important!

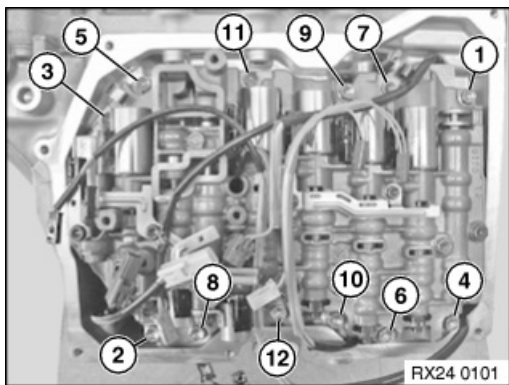
Screws have different lengths.

Numbers: 4,6,10,12=28 mm.

Numbers: 2,3,5,7,8,11=21 mm.

Numbers: 1,9=16 mm.

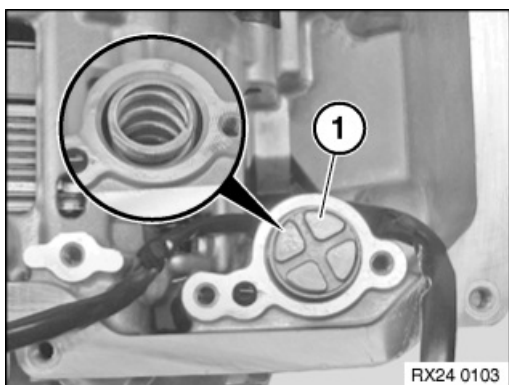




First release screws uniformly in specified order and then remove.
Remove selector unit.

Installation note:

Pay attention to installation location of cable clip and cables.



Important!

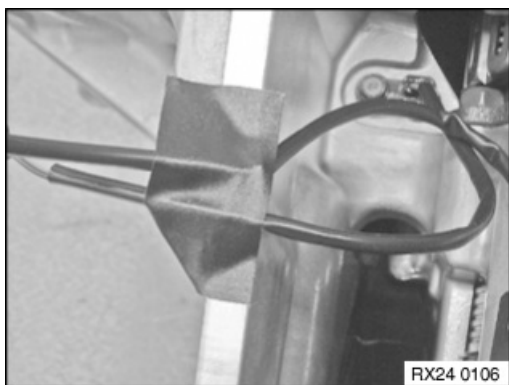
Under the selector unit at the end of the gear selector lever is the accumulator plunger (1) with spring.

Hold accumulator plunger (1) and spring firmly when removing selector unit.

Installation note:

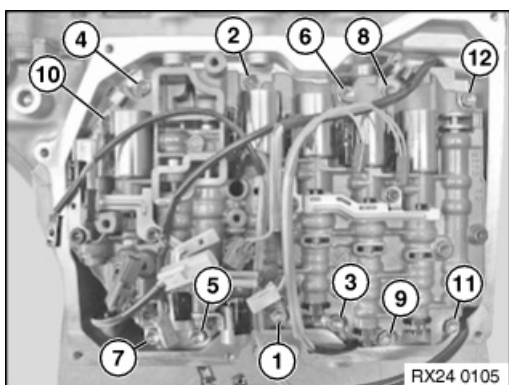
Moisten accumulator plunger and spring with ATF.

Install selector unit, accumulator plunger and spring simultaneously.



Installation note:

Before installing selector unit, secure cable with adhesive tape in installation location on housing.



Important!

Insert screws slightly during installation, align selector unit and tighten down in specified order.

Jointing torque and angle of rotation must be observed.

Tightening torque: 24 11 18AZ.



**Important!**

After completion of work, check gearbox oil level.

Use only the approved transmission oil.

Failure to comply with this requirement will result in serious damage to the automatic transmission!

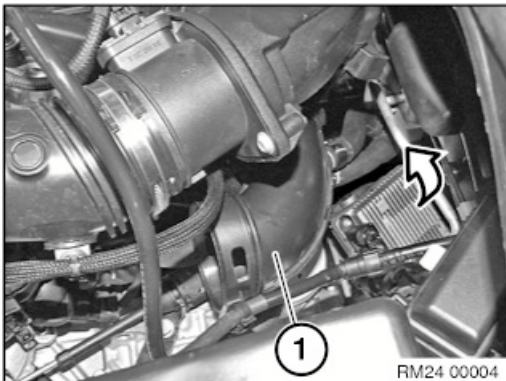
Important!

No dirt is allowed to enter the oil circuit.

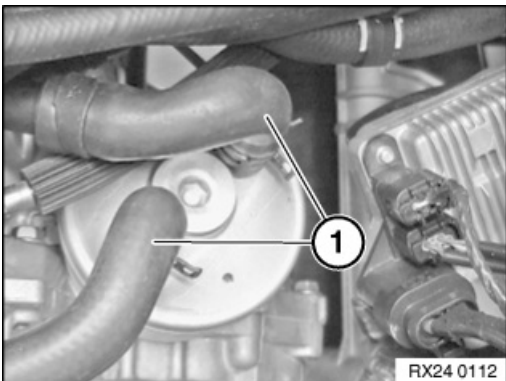
Failure to comply with this requirement will result in serious damage to the automatic transmission!

**Necessary preliminary work:**

- Drain coolant
- Remove coolant expansion tank
- Remove intake silencer housing gaiter.
- Remove intake pipe (N18)
- Remove intake silencer housing (N16)
- Partially detach gear selector cable



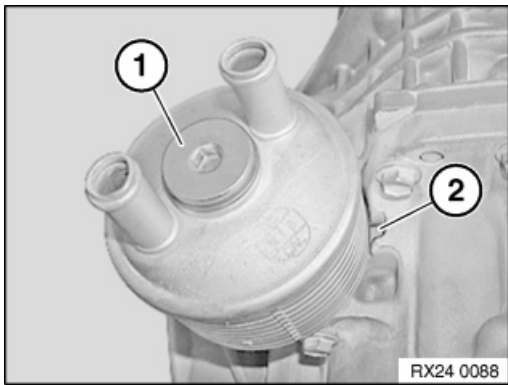
N18: Turn intake pipe (1) anti-clockwise and remove.



Unfasten hose clamps.

Detach coolant hoses (1) from transmission oil cooler.



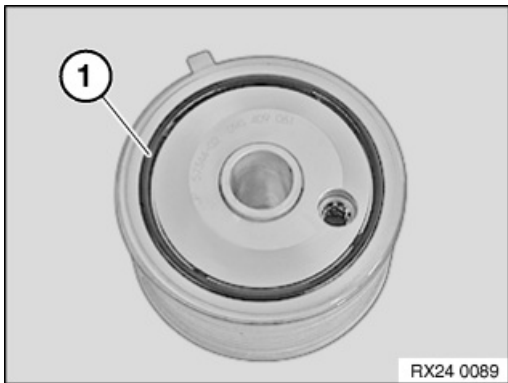


Release screw (1).

Tightening torque 24 11 11AZ.

Installation note:

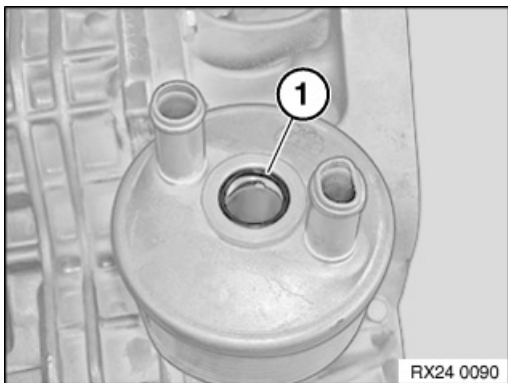
Pay attention to position lug (2).



Replace sealing ring (1). *Installation note:*

Clean contact surfaces.

Moisten sealing ring (1) with clean transmission oil.



Replace sealing ring (1). *Installation note:*

Clean contact surfaces.

Moisten sealing ring (1) with clean transmission oil.



24 11 012 Removing and installing/sealing or replacing transmission oil sump (AISIN)



Important!

- Do not let skin come in contact with transmission oil and do not inhale fuel vapours.
- Wear protective gloves.
- Ensure adequate ventilation.



Important!

Remove transmission oil sump only after it has cooled down.

After completion of repair work, check transmission oil level.

Use only the approved automatic transmission oil in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage!

Note:

Record the quantity of drained transmission oil.

Required replenishment quantity approx. 4.5 litres.



Recycling:

Catch and dispose of escaping automatic transmission fluid.

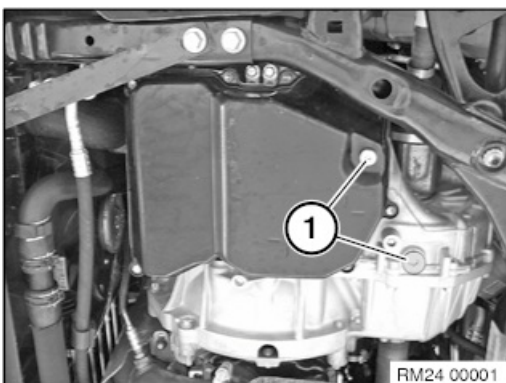
Observe country-specific waste disposal regulations.



Necessary preliminary tasks:

Secure engine in installation position.

Raise engine and transmission.



Remove underbody protection.

Release screws (1).

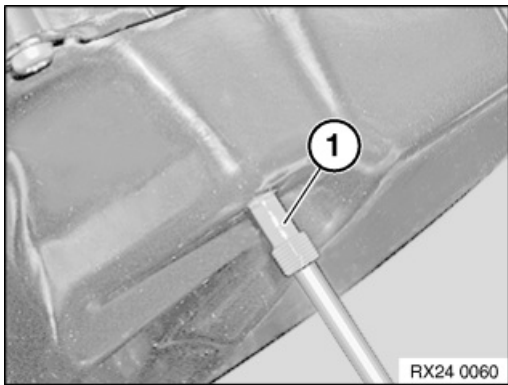
Drain off transmission fluid.

Installation note:

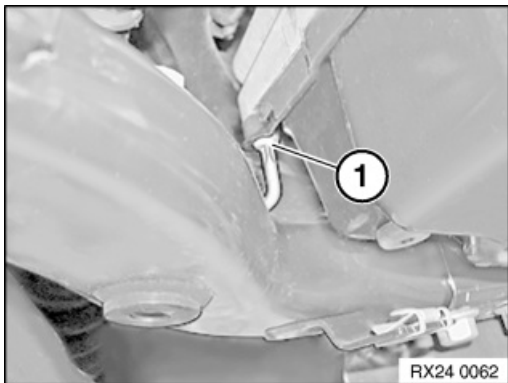
Tightening torque 24 11 1AZ.

Replace gaskets.





Screw sump tube (1) out of transmission oil sump and drain remaining transmission oil.



Release Torx screw (1).

Remove remaining mounting bolts from transmission oil sump and remove sump.

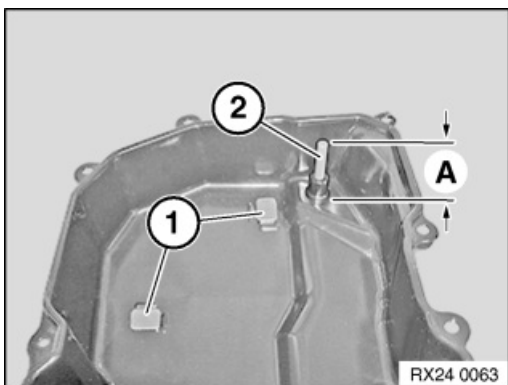
Remove oil sump gasket.

Clean sealing surfaces.

.Tightening torque 24 11 3AZ.

Installation note:

Replace gasket.



Clean sump magnets (1) and insert in new transmission oil sump.

Screw sump tube (2) into new transmission oil sump.

Measurement A: 37.35 – 38.05 mm

Tightening torque 24 11 1AZ.

Important!

Do not tighten sump tube too tightly.



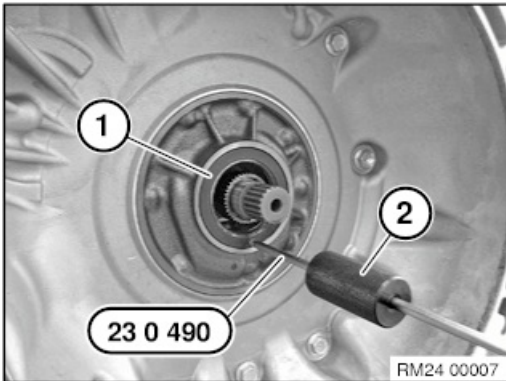
**Special tools required:**

- 23 0 490
- 24 4 250

*Note:*

Transmission removed!

Remove torque converter



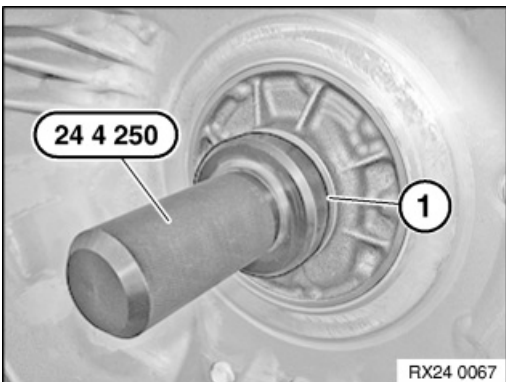
Drive a hole into radial shaft seal using a centre punch.

Important!

Do not use a drill as drillings may result in transmission malfunction.

Thread special tool 23 0 490 into radial shaft seal (1).

Drive out radial shaft seal (1) with impact weight (2).

*Installation note:*

Clean sealing surface.

Lubricate sealing lip of shaft seal with clean transmission oil.

Push radial shaft seal (1) onto special tool 24 4 250 and drive it in all the way. **Important!**

Do not damage shaft seal (1).



**Important!**

After completion of work, check transmission oil level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 litres.

**Important!**

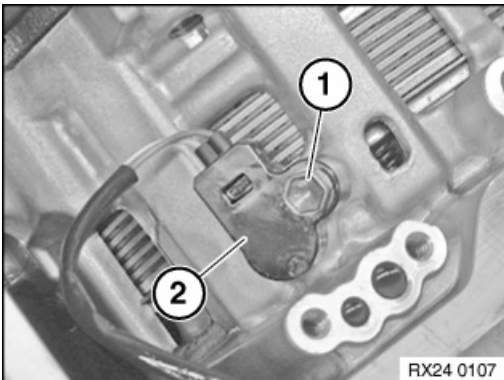
Use only the approved automatic transmission oil in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain oil before the transmission has cooled down.

**Necessary preliminary tasks:**

- Remove hydraulic shift unit



Release screw (1).

Tightening torque: 24 11 19AZ.

Remove sensor (2).



**Important!**

After completion of work, check transmission oil level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 litres.

**Important!**

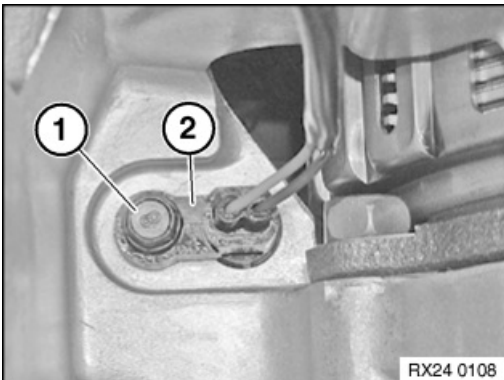
Use only the approved automatic transmission oil in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain oil before the transmission has cooled down.

**Necessary preliminary tasks:**

- Remove hydraulic shift unit



Release screw (1).

Tightening torque: 24 11 20AZ.

Remove sensor (2).

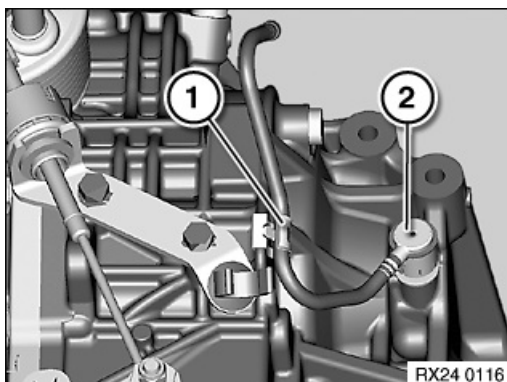


**Important!**

- Check breather for completeness after removal.
- Broken-off breather retaining lugs will result in serious damage to and failure of the automatic transmission.

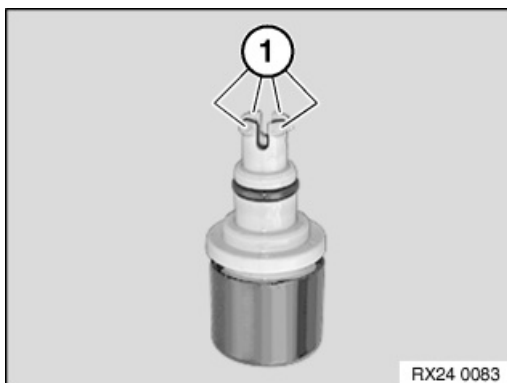
**Necessary preliminary work:**

Remove rubber mounts for gearbox mounting.



Remove hose from holder (1).

Lever breather (2) out of transmission housing with a suitable tool.



Check breather for completeness.

Retaining lugs (1) must not be broken off and be left behind in the transmission.



**Important!**

After completion of work, check transmission oil level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 litres.

**Important!**

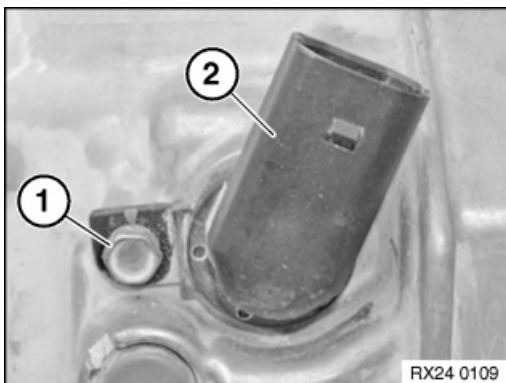
Use only the approved automatic transmission oil in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain oil before the transmission has cooled down.

**Necessary preliminary tasks:**

- Remove hydraulic shift unit



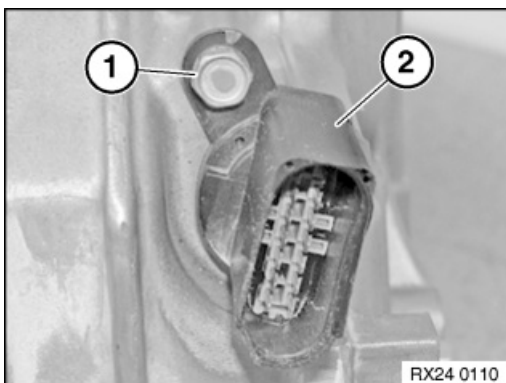
Release screw (1).

Disconnect multiple pin connector (2) of EGS control unit.

Tightening torque: 24 11 19AZ.

Installation note:

Coat O-ring with ATF.



Release screw (1).

Disconnect multiple pin connector (2) of EGS control unit.

Tightening torque: 24 11 19AZ.

Installation note:

Coat O-ring with ATF.



23 11 Transmission designations

Breakdown of MINI designation:

Manual gearbox:

GS5-65 BH/SH		
G	Transmission	
S	Transmission type	<ul style="list-style-type: none"> S = Manual gearbox A = Automatic transmission
5	Number of forward gears	
65		<ul style="list-style-type: none"> Manufacturer's code number
B	Gear set	<ul style="list-style-type: none"> B = Petrol gear ratio D = Diesel gear ratio
H	Code letter of transmission manufacturer	<ul style="list-style-type: none"> H = Midland G = Getrag Z = ZF (Zahnradfabrik Friedrichshafen)

Automatic transmission:

GACVT 16Z (CVT) Automatic		
G	Transmission	
A	Transmission type	<ul style="list-style-type: none"> S = Manual gearbox A = Automatic transmission
CVT		Electronically controlled continuously variable automatic transmission
16		<ul style="list-style-type: none"> Manufacturer's code number
Z	Code letter of transmission manufacturer	<ul style="list-style-type: none"> Z = ZF (Zahnradfabrik Friedrichshafen)

GA6F21 WA Automatic		
G	Transmission	
A	Transmission type	<ul style="list-style-type: none"> S = Manual gearbox A = Automatic transmission
6	Number of forward gears	
F21		<ul style="list-style-type: none"> Manufacturer's code number
WA	Code letter of transmission manufacturer	<ul style="list-style-type: none"> A = AISIN FT= AISIN model revision



Manual gearbox:

MINI designation	Manufacturer	Manufacturer designation	Remarks
GS5-65 BH	Midland	R65	R50
GS6--85DG	Getrag	G285D	R50
GS6--85BG	Getrag	G285	R52/R53
GS5-52 BG	Getrag	G252	R50/52
GS6--53BG	Getrag	G253	R55/R56/R57/R58/R60/R61 - N14,N16,N18 engine
GS6-55 BG	Getrag	G255	R55/R56/R57/R58/R60/R61 - N12,N16 engine
GS6--53DG	Getrag	G253	R55/R56 - W16 engine
GS6--53DG	Getrag	G253	R55/R56/R57/R58/R60/R61 - N47 engine
GS6--58BG	Getrag	G220	F56-B38
GS6-59SG/DG	Getrag	G350	F56-B37/B48
GS6-60DA/BA	AISIN	BG6	F54/F60-B36/B38/B46/B47/B48
7DCT300	Getrag	7DCT	F54/F60-B36/B37/B38/B46/B48

Automatic transmission:

MINI designation	Manufacturer	Manufacturer designation	Remarks
GA CVT 16Z	ZF	ECVT	R52
GA 6F21 WA	AISIN	F21	R52/53/R55/R56/R57/R58/R60/R61
GA 6F21 FT	AISIN	F21 model revision	F56-B37/B38/B48
GA 8F22 FRUs	AISIN	GA8F22AW	
GA 8G45	AISIN	8G45	



24 12 110 Removing and installing/replacing radial shaft seal for gearshift shaft (AISIN)



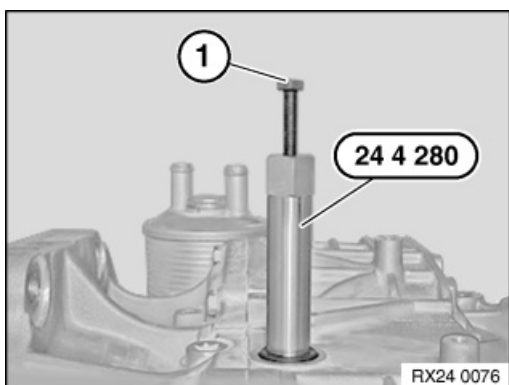
Special tools required:

- 24 4 280
- 24 4 290



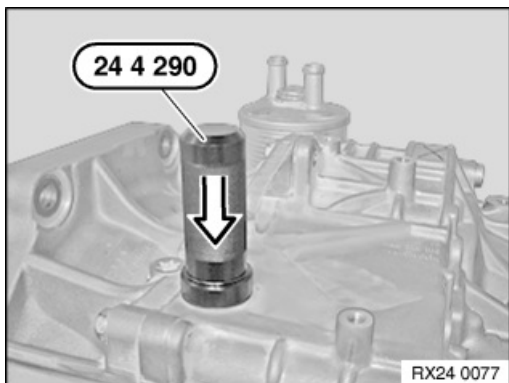
Necessary preliminary work:

- Remove gear position switch



Screw special tool 24 4 280 firmly into radial shaft seal.

Pull sealing ring out of transmission housing by means of bolt (1).



Installation note:

Coat sealing lips of new radial shaft seal with clean transmission oil.

Drive in radial shaft seal with special tool 24 4 290 until it stops.

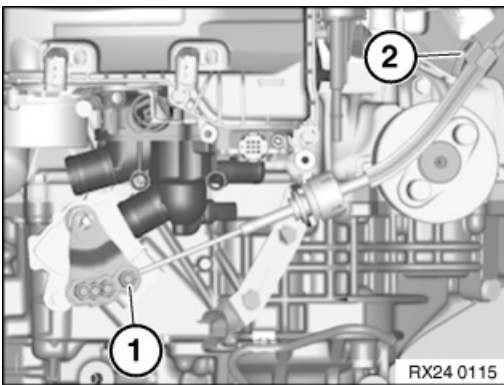


**Important!**

An incorrectly adjusted gearshift mechanism can result in tooth meshing noises be transmitted into the passenger compartment.

**Necessary preliminary work:**

- Remove intake silencer housing.
- Remove intake silencer housing gaiter.
- Move selector lever into "P" position.

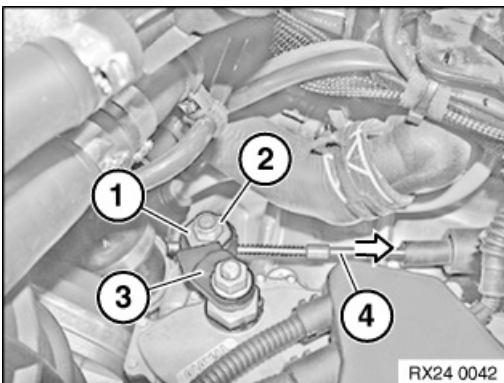


Insert the end of the gear selector cable into the locating sleeve (1) of selector lever.

Insert gear selector cable in holder.

Secure gear selector cable with clip to retaining bracket (2).

Move selector lever to "P" position (in counterclockwise direction).



Grip nut (1) and tighten down nut (2).

Note:

Press against end of gear selector cable shortly before tightening down screw.

Tightening torque 24 11 8AZ.

Note:

Graphic similar.



**Special tools required:**

- 24 4 270
- 17 2 051

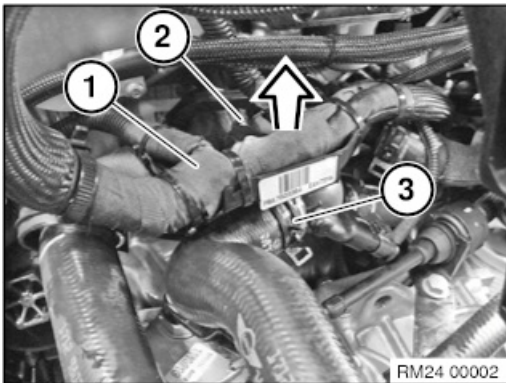
**Important!**

An incorrectly adjusted gearshift mechanism can result in gear tooth meshing noises being transmitted to the passenger compartment.

Adjust selector lever.

**Necessary preliminary tasks:**

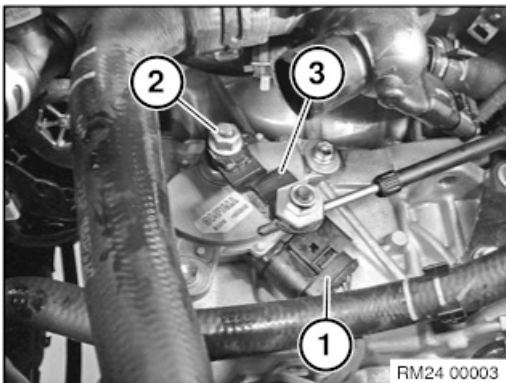
- Remove gaiter for intake silencer housing
- Drain coolant
- Remove intake silencer housing
- Remove coolant expansion tank



Detach wiring harness (1) from bracket (2) and pull up.

Release spring band clamp (3) on coolant hose with special tool 17 2 051 .

Remove coolant hose.

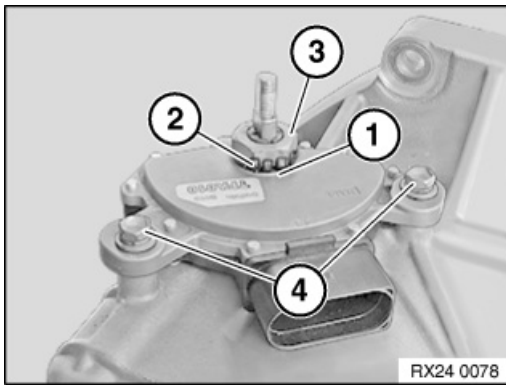


Unfasten plug connection (1) from transmission position sensor and disconnect.

Release nut (2) and remove selector lever (3).

Tightening torque 24 11 6AZ.





Release washer (1), lock washer (2) and nut (3).

Release screws (4).

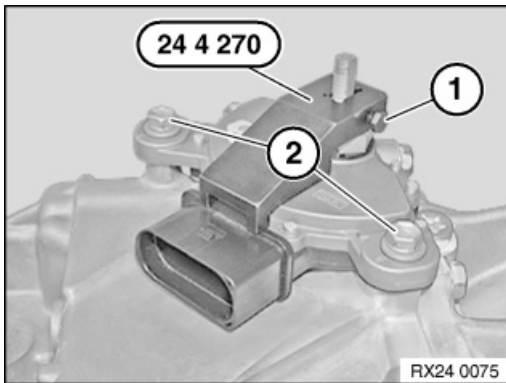
Remove switch.

Installation note:

Insert screws (4) slightly.

Fit washer, lock washer and nut.

Tightening torque 24 11 12AZ.



Mount special tool 24 4 270 .

Tighten screw (1).

Align gear position switch to 'N'.

Tighten down screws (2).

Tightening torque 24 11 12AZ.

Installation note:

Connect gear position switch connector



24 12 110 Removing and installing/replacing radial shaft seal for gearshift shaft (AISIN)



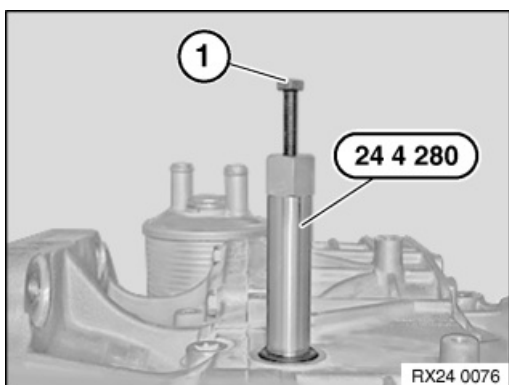
Special tools required:

- 24 4 280
- 24 4 290



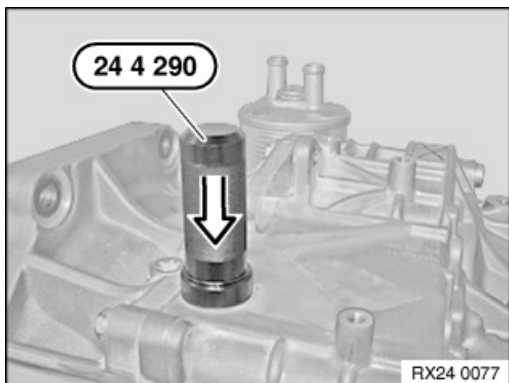
Necessary preliminary work:

- Remove gear position switch



Screw special tool 24 4 280 firmly into radial shaft seal.

Pull sealing ring out of transmission housing by means of bolt (1).



Installation note:

Coat sealing lips of new radial shaft seal with clean transmission oil.

Drive in radial shaft seal with special tool 24 4 290 until it stops.





Note:
Troubleshooting with DIS Tester.



24 21 230 Remove and reinstall the radial shaft seal of the right output shaft with the special tool 2 452 307 (AISIN) W16,N12,N14N16N18



Special tools required:

- 2 452 307
- 31 2 310

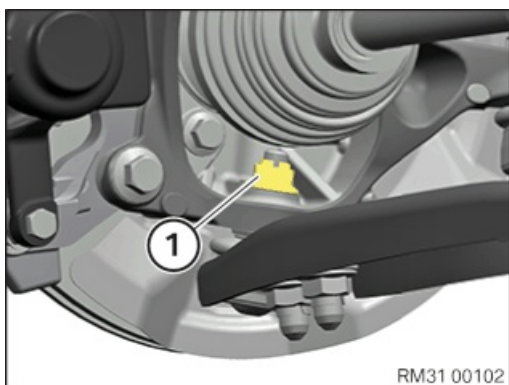


Necessary preliminary work:

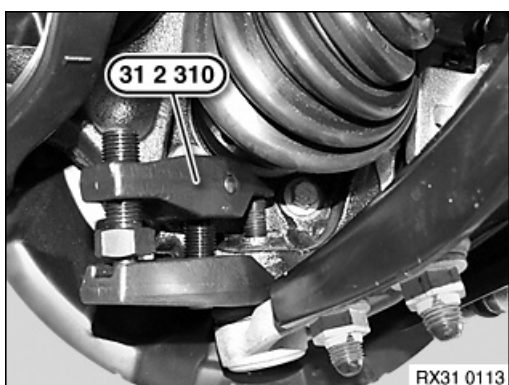
- Disconnect battery negative lead.
- Remove right front wheel .



Removal:

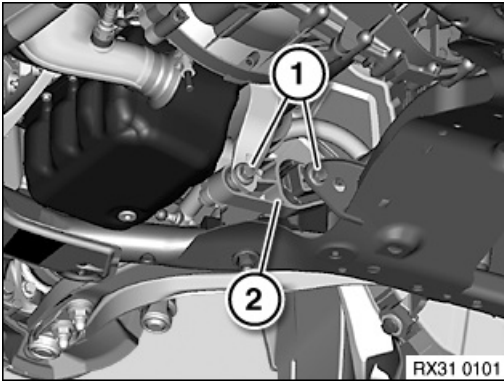


Release nut (1) at the screw connection of the wheel guide joint on the right swivel bearing.



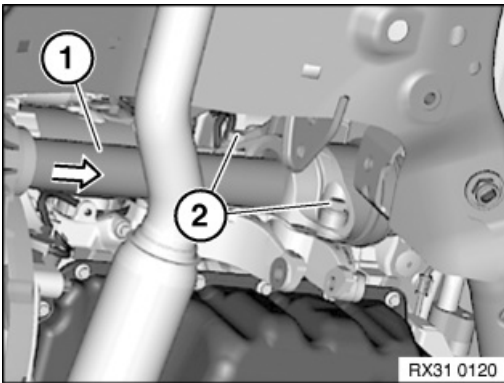
Use special tool 31 2 310 to push off wheel guide joint from swivel bearing.





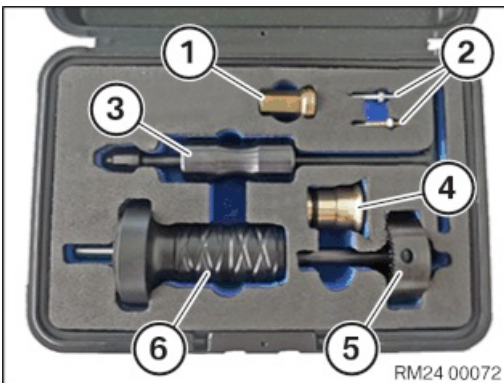
Loosen screws (1).

Remove anti-roll bar link (2).



Loosen screws (2).

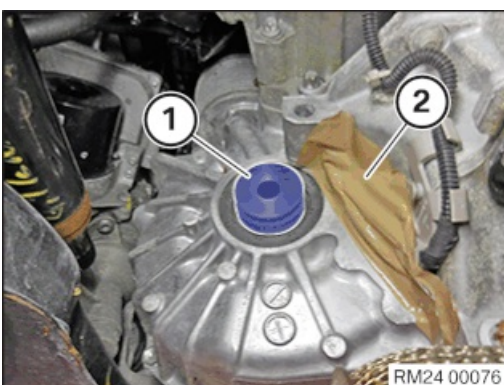
Pull out the output shaft (1) from the automatic transmission and hang it to the side.



Renew radial shaft seal with special tool 2 452 307 .

Use the special tool 2 452 307 from the case:

- (1) Nut
- (2) Centre punch, wind-in tip
- (3) Puller
- (4) Guide sleeve
- (5) Milling tool
- (6) Punching pin

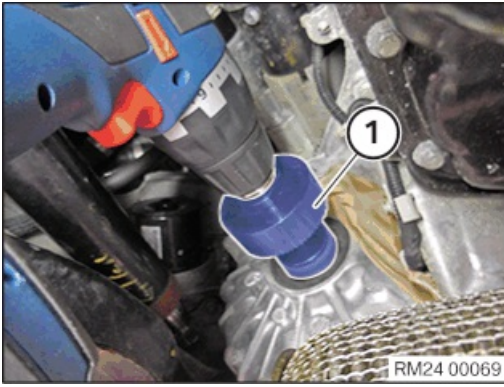


Close the opening to the transmission with adhesive tape (2).

- The adhesive tape prevents the swarfs from penetrating the transmission housing.

Set the guide sleeve (1) in the opening of the output shaft in the automatic transmission.





Warning!

Risk of injury. Only use a drill with activated slip clutch!

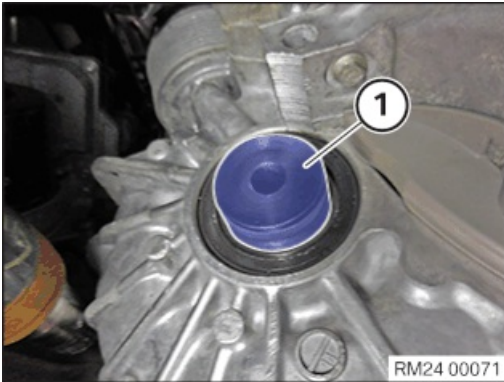
Place the milling tool (1) in the drill.

Cut the protrusion at the crankcase with the milling tool (1).

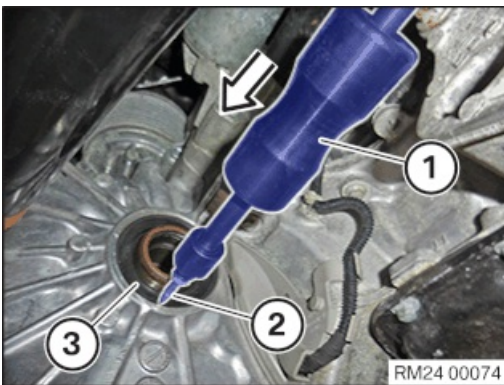
Attention!

Keep swarf away from the transmission because they may lead to a transmission failure.

Remove the swarf and clean the transmission.

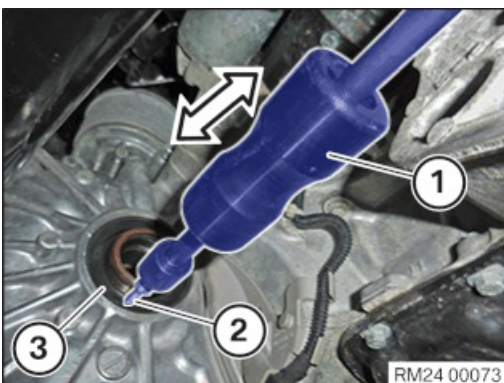


Remove Guide sleeve (1).



Use the centre punch (2) and the impact weight of the puller (1) to drive a hole into the radial shaft seal (3). **Attention!**

Do not use a drill as swarf may result in transmission malfunction.



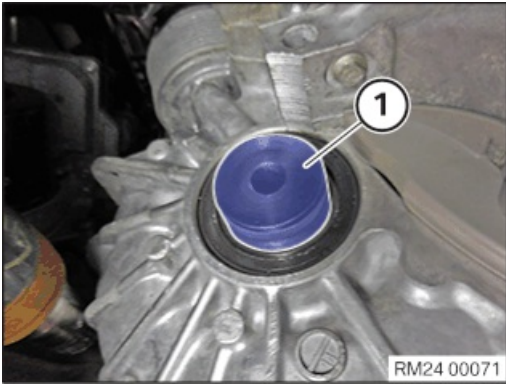
Screw in the puller (1) with the wind-in tip (2) into the radial shaft seal (3).

Drive the radial shaft seal (3) out with the impact weight of the puller (1).

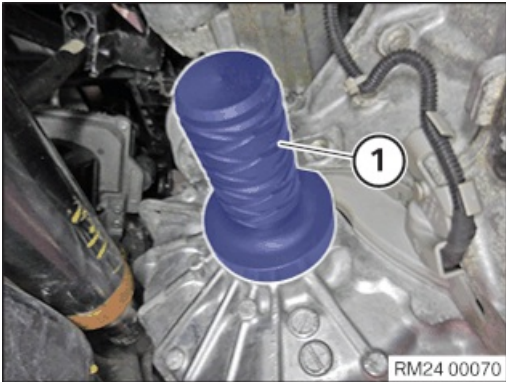


Installation:

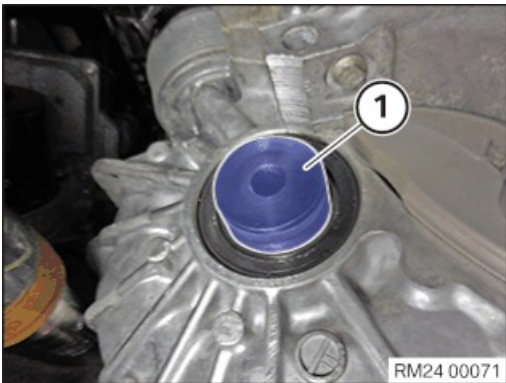




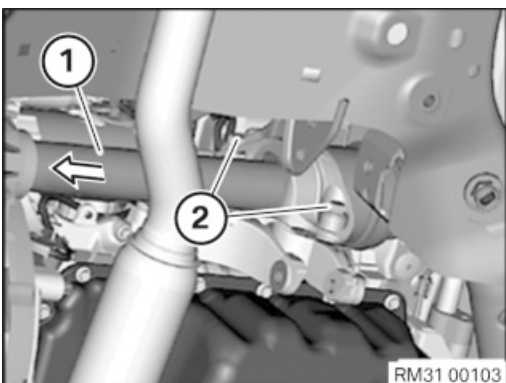
Install guide sleeve (1).



Coat sealing lips of new radial shaft seal with clean transmission oil.
Drive the radial shaft seal to the limit position with the punching pin (1).

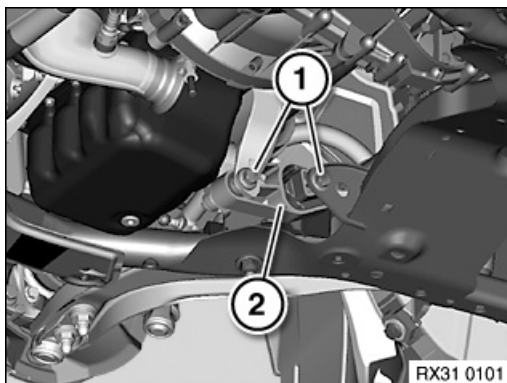


Remove Guide sleeve (1).

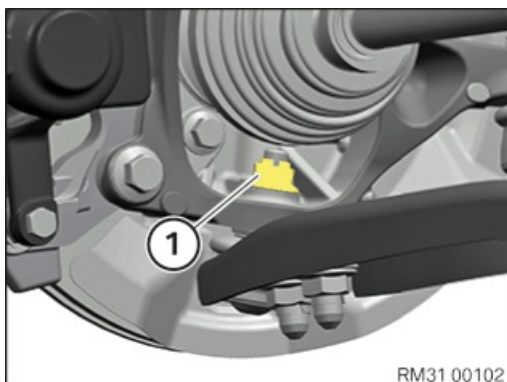


Push in the output shaft (1) in the automatic transmission.
Tighten down screws (2).
Tightening torque 31 60 1AZ.





Position the anti-roll bar link (2).
Tighten down screws (1).
Tightening torque 22 11 6AZ/ 9AZ



Keep wheel control joint to swivel bearing connection clean and free from oil and grease.

Position wheel guide joint on swivel bearing .

Replace nut (1).

Parts: Nut

Tighten nut (1).

Tightening torque 31 12 2AZ.



After installation:

- Connect battery earth lead.
- Check and if necessary, top up the oil level in the automatic transmission.
- Install front right wheel.

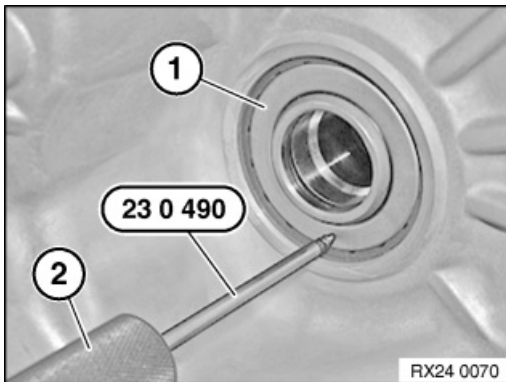


**Special tools required:**

- 23 0 490
- 24 4 300

**Necessary preliminary tasks:**

- Drain transmission fluid
- Remove left axle shaft



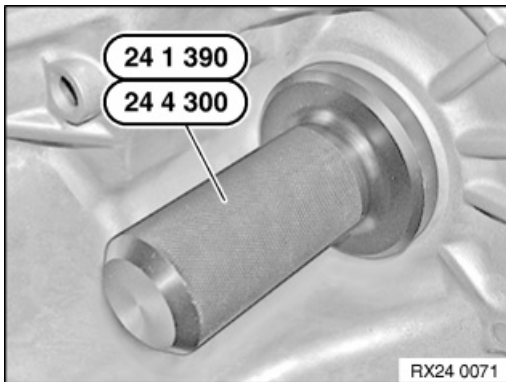
Drive a hole into radial shaft seal using a centre punch.

Important!

Do not use a drill as drillings may result in transmission malfunction.

Thread special tool 23 0 490 into radial shaft seal (1).

Drive out radial shaft seal (1) with impact weight (2).

**Installation note:**

Coat sealing lips of new radial shaft seal with clean transmission oil.

Radial shaft seal firmly home with special tool 24 4 300 .



24 21 230 Removing radial shaft seal of right axle shaft (AISIN) all-wheel drive vehicle N18



Special tools required:

- 24 0 210
- 24 0 220
- 24 0 230
- 24 0 240



Caution!

After completion of work check gearbox oil level and for leaks.

The vehicle must be parked on a level surface in the workshop to check the transmission oil level.

Use only the approved transmission oil.

Failure to comply with this instruction will result in serious damage to the transmission.



Recycling:

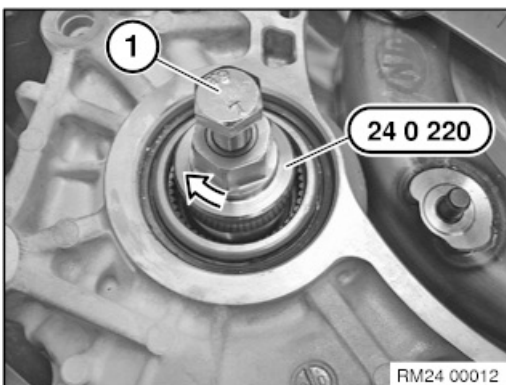
Catch and dispose of escaping transmission oil.

Observe country-specific waste disposal regulations.



Necessary preliminary work:

- Remove transfer box (PTO)
- Remove transmission



Screw in special tool 24 0 220 to the radial shaft seal (**small diameter**).

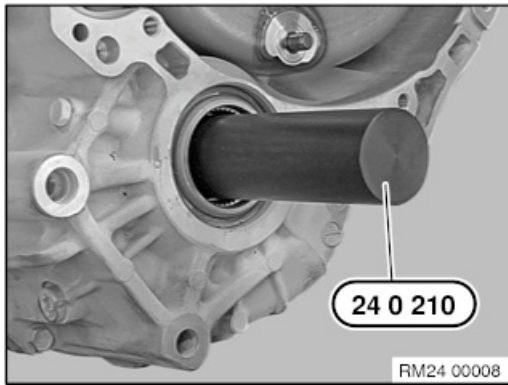
Screw in bolt (1) and pull out radial shaft seal.

Caution!

Risk of damage:

Damage to the gearbox housing will result in oil leaks!

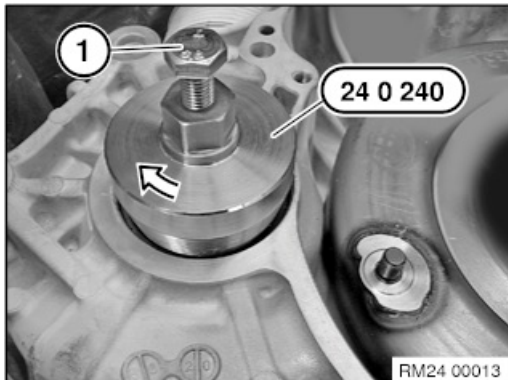




Installation note:

Coat sealing lips of new radial shaft seal with clean transmission oil.

Using special tool 24 0 210 drive in radial shaft seal (**small diameter**) into housing.



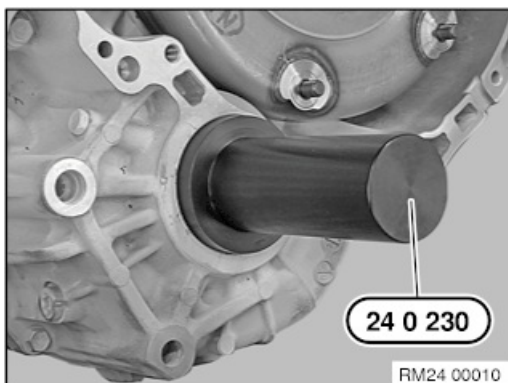
Screw in special tool 24 0 240 to the radial shaft seal (**large diameter**).

Screw in bolt (1) and pull out radial shaft seal.

Caution!

Risk of damage:

Damage to the gearbox housing will result in oil leaks!



Installation note:

Coat sealing lips of new radial shaft seal with clean transmission oil.

Using special tool 24 0 230 drive in radial shaft seal (**large diameter**) into housing.



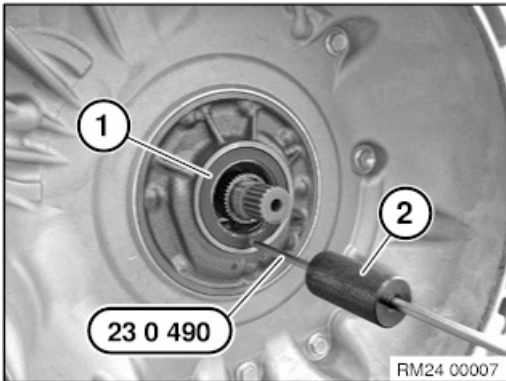
**Special tools required:**

- 23 0 490
- 24 4 250

*Note:*

Transmission removed!

Remove torque converter



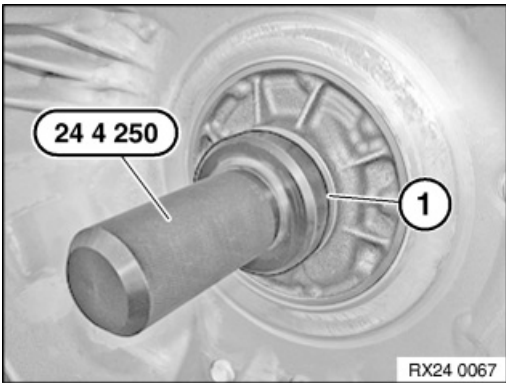
Drive a hole into radial shaft seal using a centre punch.

Important!

Do not use a drill as drillings may result in transmission malfunction.

Thread special tool 23 0 490 into radial shaft seal (1).

Drive out radial shaft seal (1) with impact weight (2).

*Installation note:*

Clean sealing surface.

Lubricate sealing lip of shaft seal with clean transmission oil.

Push radial shaft seal (1) onto special tool 24 4 250 and drive it in all the way. **Important!**

Do not damage shaft seal (1).



**Important!**

After completion of work, check transmission oil level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 litres.

**Important!**

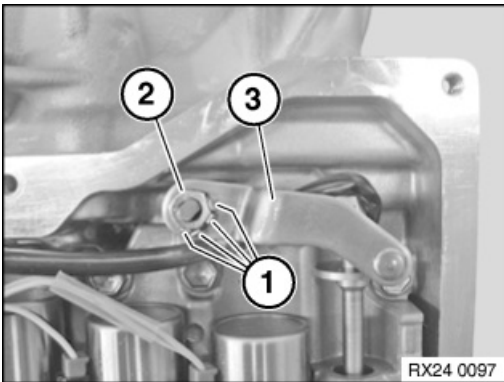
Use only the approved automatic transmission oil in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain oil before the transmission has cooled down.

**Necessary preliminary tasks:**

- Remove transmission oil sump
- Remove transmission oil strainer

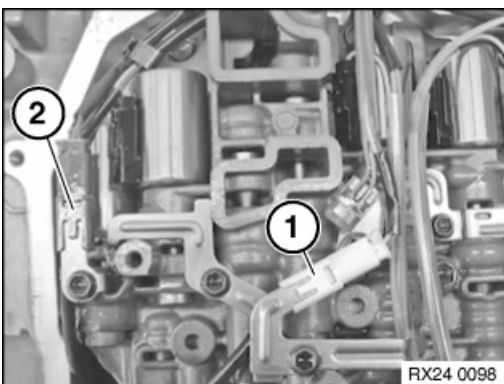


Bend open retaining lugs (1) of hand valve lever.

Slacken nut (2).

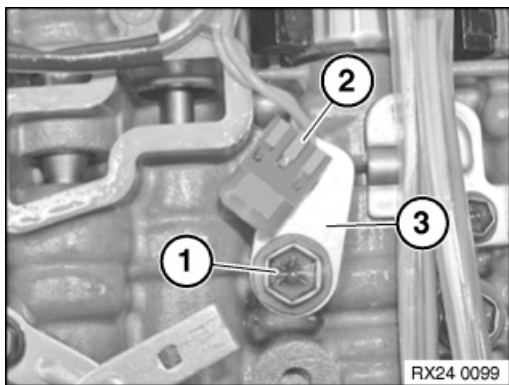
Tightening torque: 24 11 17AZ.

Remove hand valve lever (3).



Release connectors (1/2) from holders and disconnect.





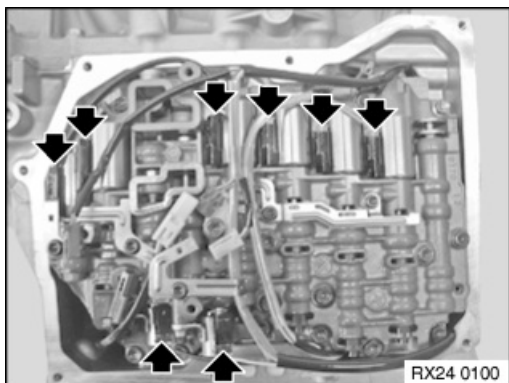
Release screw (1).

Tightening torque: 24 11 17AZ.

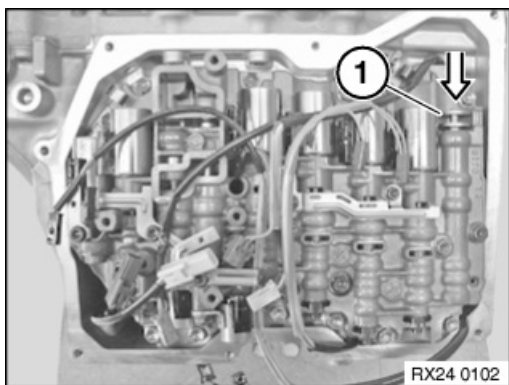
Remove oil temperature sensor (2) with locking plate (3).

Installation note:

Moisten seal with ATF.

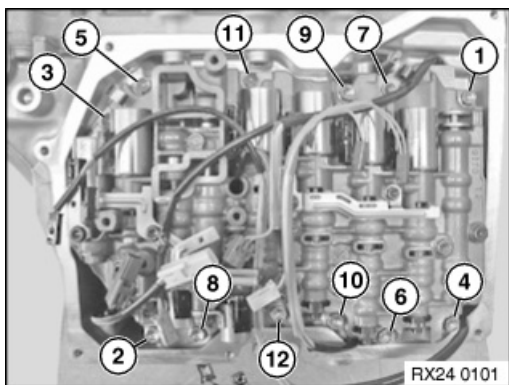


Disconnect plugs of magnet and pressure valves. *Installation note:*
Pay attention to routing of cables.



Important!

When removing selector unit, slide in gear selector valve (1) and hold down.



Important!

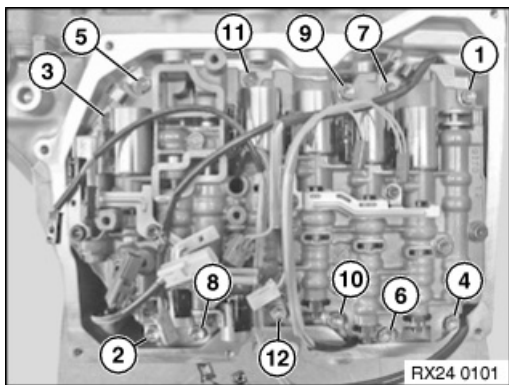
Screws have different lengths.

Numbers: 4,6,10,12=28 mm.

Numbers: 2,3,5,7,8,11=21 mm.

Numbers: 1,9=16 mm.

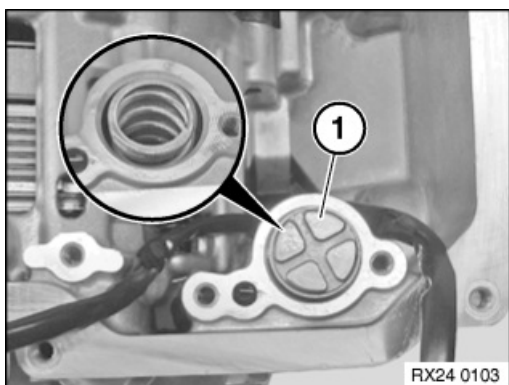




First release screws uniformly in specified order and then remove.
Remove selector unit.

Installation note:

Pay attention to installation location of cable clip and cables.



Important!

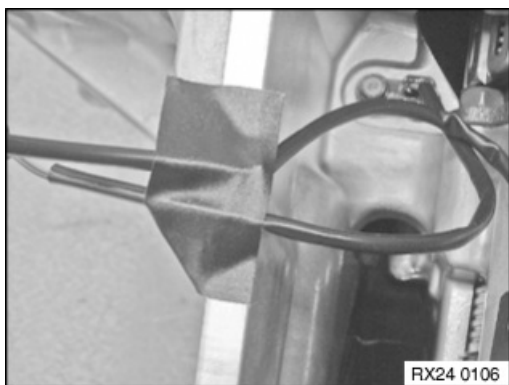
Under the selector unit at the end of the gear selector lever is the accumulator plunger (1) with spring.

Hold accumulator plunger (1) and spring firmly when removing selector unit.

Installation note:

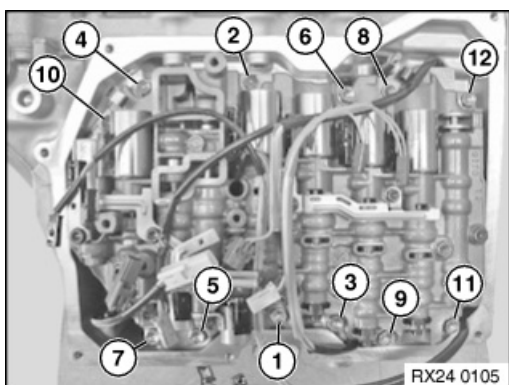
Moisten accumulator plunger and spring with ATF.

Install selector unit, accumulator plunger and spring simultaneously.



Installation note:

Before installing selector unit, secure cable with adhesive tape in installation location on housing.



Important!

Insert screws slightly during installation, align selector unit and tighten down in specified order.

Jointing torque and angle of rotation must be observed.

Tightening torque: 24 11 18AZ.





Attention!

After completion of work, check gearbox oil level.

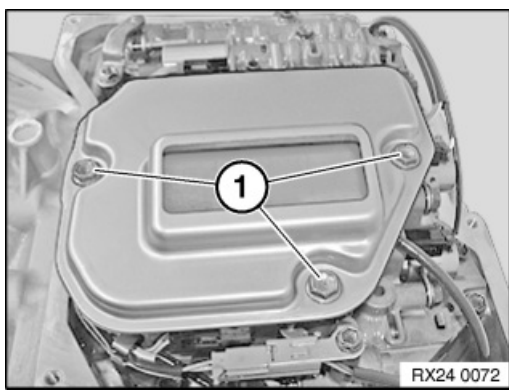
Use only the approved transmission oil.

Failure to comply with this requirement will result in serious damage to the automatic transmission!



Necessary preliminary work:

- Remove gearbox oil sump



Release screws (1).

Remove oil strainer.

Tightening torque 24 11 10AZ.

Installation note:

Clean contact surfaces.



**Important!**

After completion of work, check transmission oil level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 litres.

**Important!**

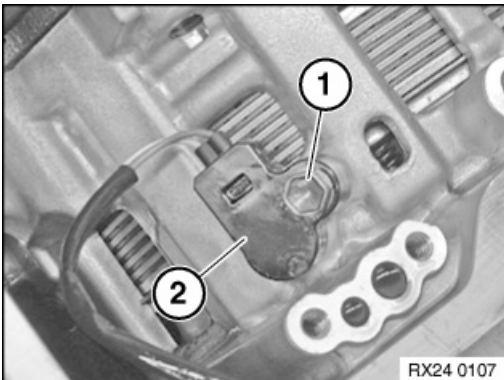
Use only the approved automatic transmission oil in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain oil before the transmission has cooled down.

**Necessary preliminary tasks:**

- Remove hydraulic shift unit



Release screw (1).

Tightening torque: 24 11 19AZ.

Remove sensor (2).



**Important!**

After completion of work, check transmission oil level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 litres.

**Important!**

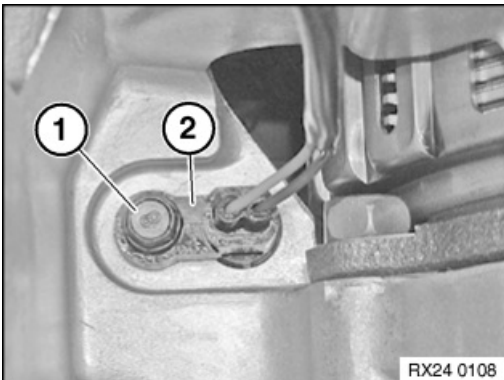
Use only the approved automatic transmission oil in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain oil before the transmission has cooled down.

**Necessary preliminary tasks:**

- Remove hydraulic shift unit



Release screw (1).

Tightening torque: 24 11 20AZ.

Remove sensor (2).



**Important!**

After completion of work, check transmission oil level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 litres.

**Important!**

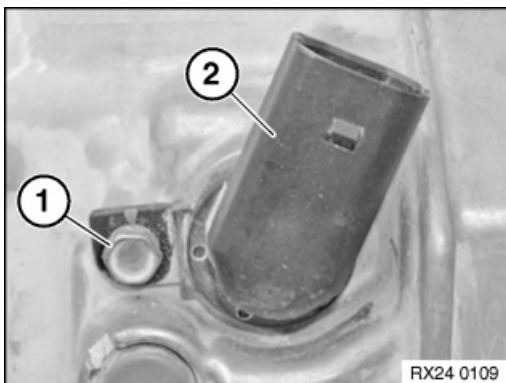
Use only the approved automatic transmission oil in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain oil before the transmission has cooled down.

**Necessary preliminary tasks:**

- Remove hydraulic shift unit



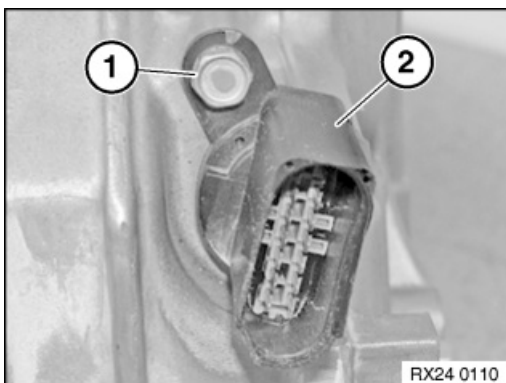
Release screw (1).

Disconnect multiple pin connector (2) of EGS control unit.

Tightening torque: 24 11 19AZ.

Installation note:

Coat O-ring with ATF.



Release screw (1).

Disconnect multiple pin connector (2) of EGS control unit.

Tightening torque: 24 11 19AZ.

Installation note:

Coat O-ring with ATF.



**Special tools required:**

- 00 2 550
- 24 4 260

**Important!**

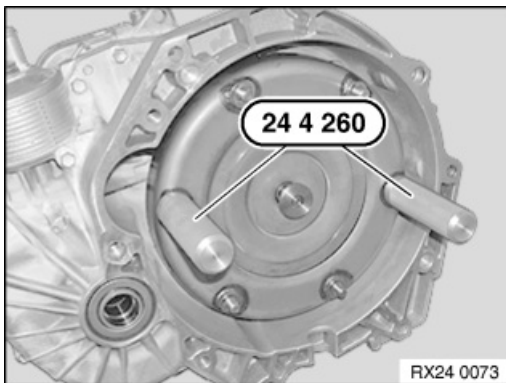
After completion of repair work, check transmission oil level.

Use only approved transmission oil.

Failure to comply with this instruction will result in serious damage to the transmission.

**Necessary preliminary tasks:**

- Remove automatic transmission



Screw special tool 24 4 260 to torque converter.

Remove torque converter.

Note:

Do not damage radial shaft seal when removing torque converter.

Remove torque converter and set down vertically.

When torque converter is removed, transmission oil flows out.

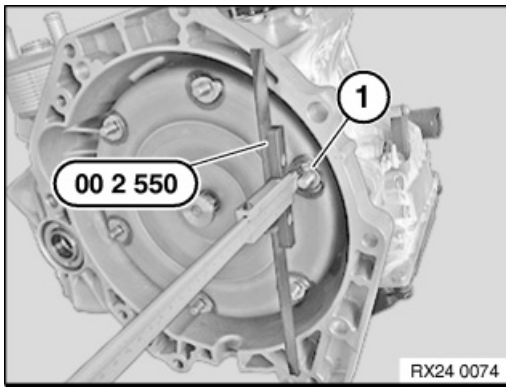
**Installation note:**

Do not damage radial shaft seal and bearing.

If the torque converter is not correctly installed, the driver of the transmission oil pump may be damaged when the transmission is flanged to the engine.

Align the torque converter in such a way that the recess on the converter hub lines up with the oil pump driver.



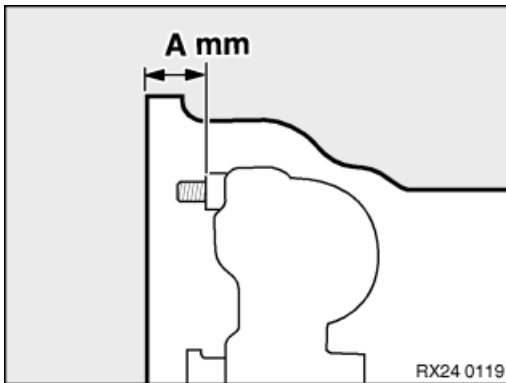


Installation note:

Push torque converter with special tool 24 4 260 through radial shaft seal onto transmission shaft as far as it will go.

Press torque converter by hand into converter housing. Converter hub recess must snap into place in driver of pump impeller. Torque converter must be felt to slip inwards.

Determine distance between contact surface and surface (1) of threaded hole in torque converter with special tool 00 2 550 .



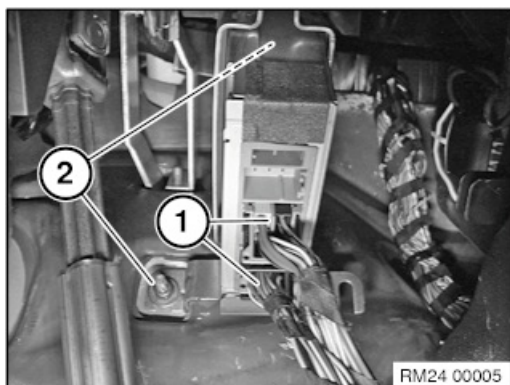
Note:

Measured value must be greater than A.

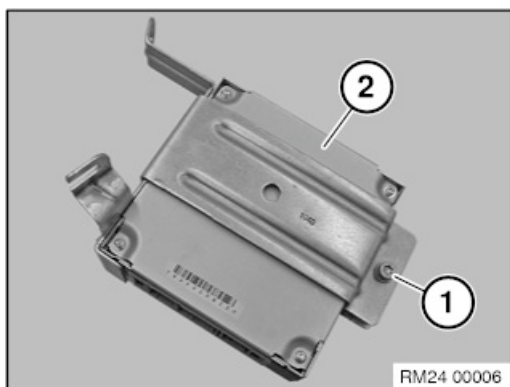
A = 14,5 mm



Clamp off battery.



Installation location: Above pedal mechanism
Release plug connections (1) and disconnect.
Unscrew nuts (2).
Tightening torque 24 61 1AZ.
Remove bracket and control unit.



Release screw (1) and remove control unit (2) from bracket.
Tightening torque 24 61 2AZ.

Important!

The adaptation values must be reset after the control unit has been replaced.



00 11 500 Checking/topping up oil level in automatic transmission (AISIN)N18 N16



Special tools required:

- 24 4 240



Important!

Use only the approved automatic transmission oil in this automatic transmission.

Failure to comply with this requirement will result in serious damage to the automatic transmission!

Installation note:

Details of approved oil grade:

refer also to adhesive label on transmission oil sump.



Note:

Level out oil level in automatic transmission via overflow connector.



Necessary preliminary tasks:

Remove underbody protection.

On vehicles with hydraulic steering gear:

Remove heat shield from hydraulic steering gear.

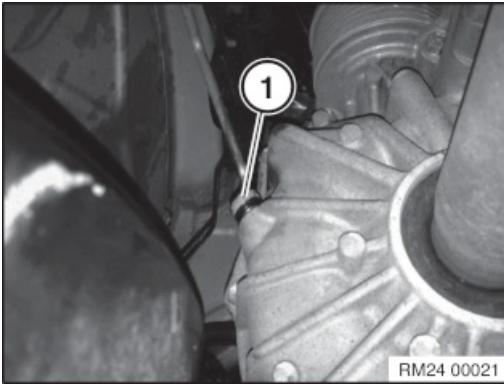
Tightening torque 32 41 12AZ.



Note:

Special tool 24 4 240 must be shortened to overall length of 36 mm.





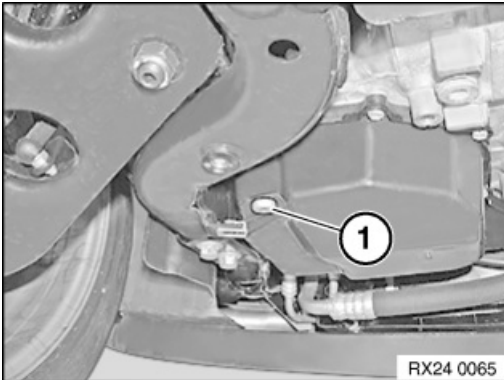
Move selector lever to "P" position.

The vehicle must be horizontal and secured against rolling off.

Connect BMW diagnosis system.

Release oil filler plug (1) using special tool 24 4 240 .

Tightening torque 24 11 2AZ.



Top up transmission oil. (Transmission oil has been drained)

Remove M10 oil drain plug (1) from transmission oil sump.

Tightening torque 24 11 1AZ.

Pour in automatic transmission fluid through oil filler plug until oil emerges at oil drain plug.

Start engine and run at idle speed.

Check whether ATF emerges at M10 oil drain plug.

If not, continue to add ATF.

Actuate footbrake and at idle shift through all gears "P" to "D" twice for more than 2 seconds.

Then move switch to "P" position.

Again check whether ATF emerges at M10 oil drain plug.

Check the temperature of the automatic transmission fluid with the BMW Diagnosis System.

Increase temperature of automatic transmission fluid to 35 ... 45 °C.

Top up automatic transmission fluid until it flows over.

Screw in oil filler plug and oil drain plug.

Tightening torque 24 11 1/2AZ.

Installation note:

Replace sealing rings.

Check oil level (oil temperature must be between 35 and 45 °C):

Open oil filler plug.

Slacken oil drain plug (1).

Tightening torque 24 11 1/2AZ.

Start engine and run at idle speed.

Unscrew oil drain plug.

Check whether ATF emerges at oil drain plug (1).

If not, pour in ATF up to oil filler plug.

Top up automatic transmission fluid until it overflows at oil drain plug.

Actuate footbrake and at idle shift through all gears "P" to "D" twice for more than 2 seconds.

Move switch to "P" position.

Check oil level again.

Seal screws when the oil emerges slightly from the drain plug.

Tightening torque 24 11 1/2AZ.



**Important!**

Transmissions are filled with fluid. Oil level does not have to be compensated!

Only in the event of discernible external damage to exchange transmission or discernible oil leakage from exchange transmission - check oil level.

After completing work:

- Use only the approved automatic transmission fluid.
- Reset adaptation values.
- Perform clutch and gear ratio adaptation.

Failure to comply with this requirement will result in serious damage to the automatic transmission!

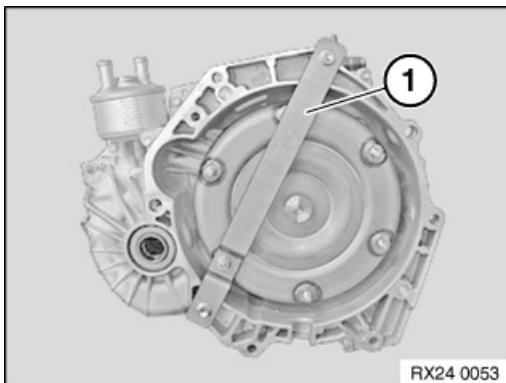
**Recycling:**

Catch and dispose of escaping transmission oil.

Observe country-specific waste disposal regulations

**Necessary preliminary tasks:**

- Remove automatic transmission (**without wheel alignment!**).



Convert following components from previous transmission to new transmission.

- Converter, transportation retainer (1).
- Holder with retaining clips for wiring harness
- Modify ventilation pipe
- Transportation plate
- Transmission carrier with transmission support block

Tightening torque 24 11 9AZ.



24 21 230 Remove and reinstall the radial shaft seal of the right output shaft with the special tool 2 452 307 (AISIN) W16,N12,N14N16N18



Special tools required:

- 2 452 307
- 31 2 310

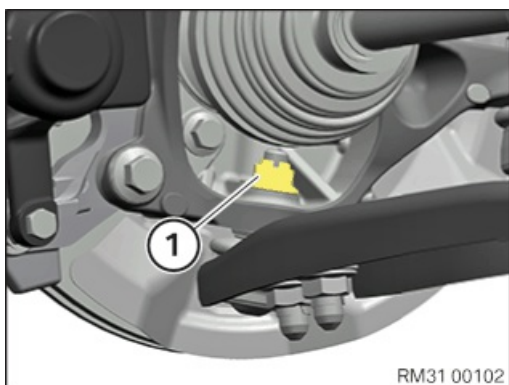


Necessary preliminary work:

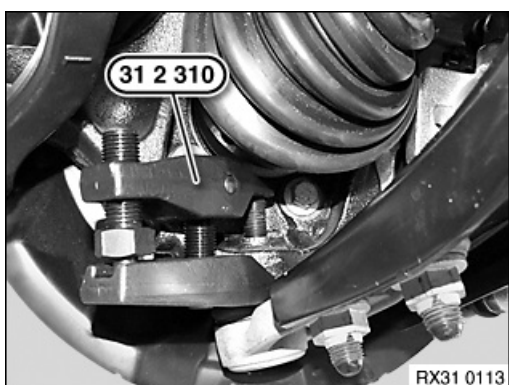
- Disconnect battery negative lead.
- Remove right front wheel .



Removal:

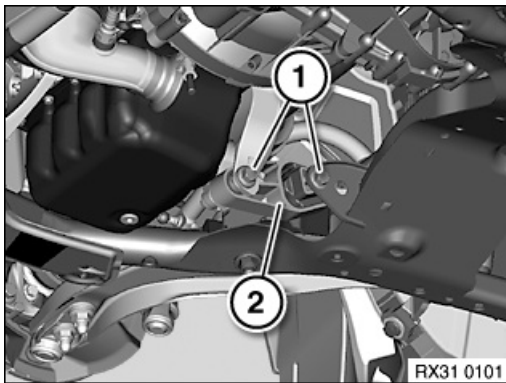


Release nut (1) at the screw connection of the wheel guide joint on the right swivel bearing.



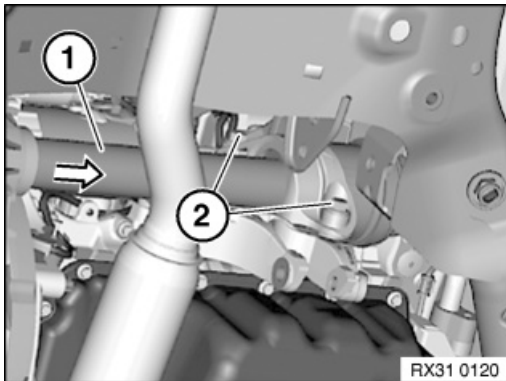
Use special tool 31 2 310 to push off wheel guide joint from swivel bearing.





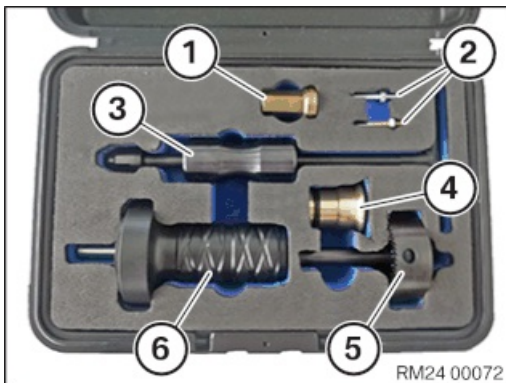
Loosen screws (1).

Remove anti-roll bar link (2).



Loosen screws (2).

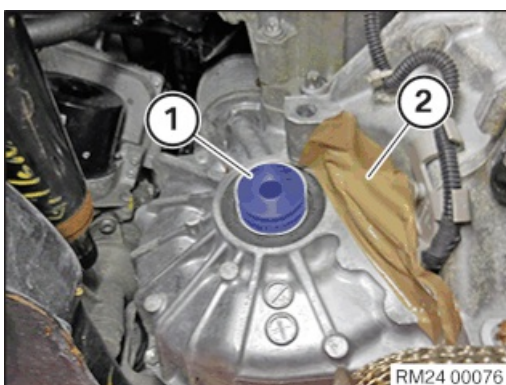
Pull out the output shaft (1) from the automatic transmission and hang it to the side.



Renew radial shaft seal with special tool 2 452 307 .

Use the special tool 2 452 307 from the case:

- (1) Nut
- (2) Centre punch, wind-in tip
- (3) Puller
- (4) Guide sleeve
- (5) Milling tool
- (6) Punching pin

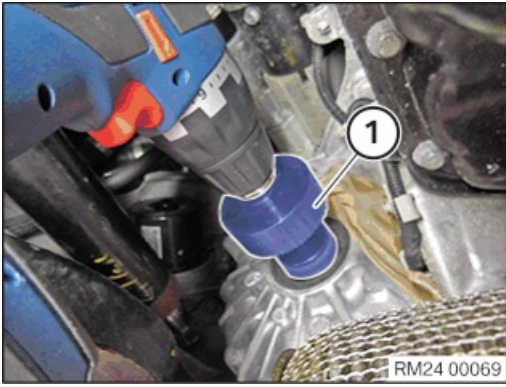


Close the opening to the transmission with adhesive tape (2).

- The adhesive tape prevents the swarfs from penetrating the transmission housing.

Set the guide sleeve (1) in the opening of the output shaft in the automatic transmission.





Warning!

Risk of injury. Only use a drill with activated slip clutch!

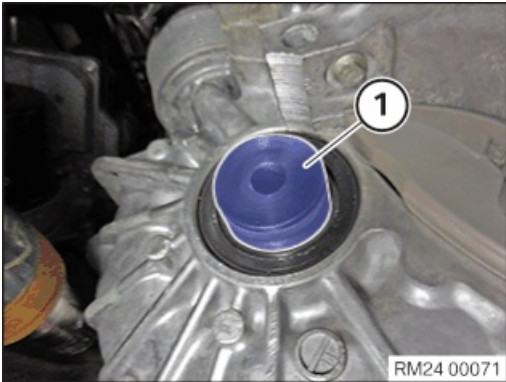
Place the milling tool (1) in the drill.

Cut the protrusion at the crankcase with the milling tool (1).

Attention!

Keep swarf away from the transmission because they may lead to a transmission failure.

Remove the swarf and clean the transmission.

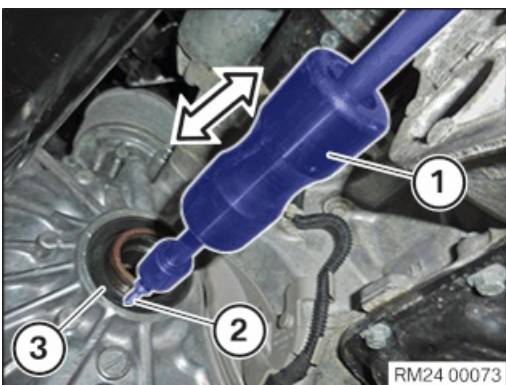


Remove Guide sleeve (1).



Use the centre punch (2) and the impact weight of the puller (1) to drive a hole into the radial shaft seal (3). **Attention!**

Do not use a drill as swarf may result in transmission malfunction.



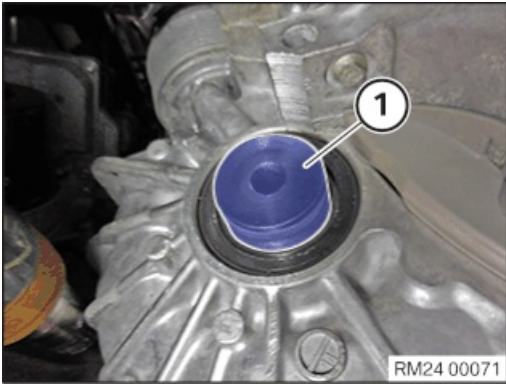
Screw in the puller (1) with the wind-in tip (2) into the radial shaft seal (3).

Drive the radial shaft seal (3) out with the impact weight of the puller (1).

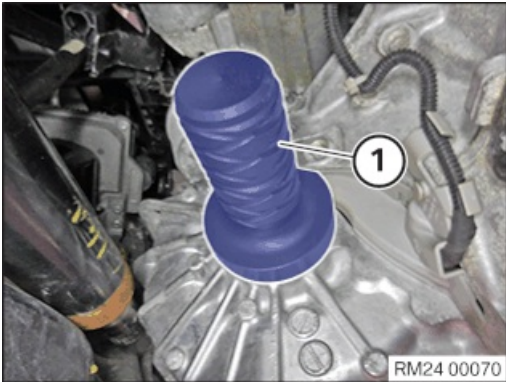


Installation:

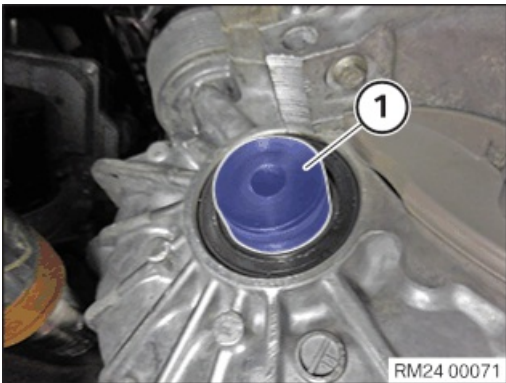




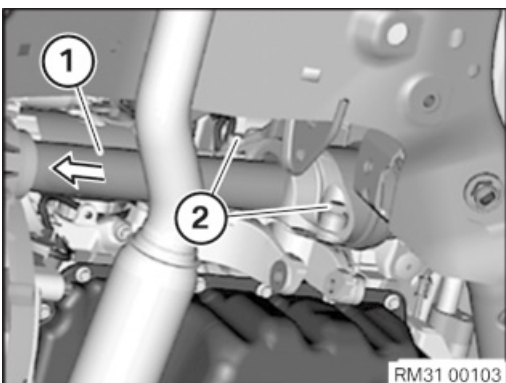
Install guide sleeve (1).



Coat sealing lips of new radial shaft seal with clean transmission oil.
Drive the radial shaft seal to the limit position with the punching pin (1).

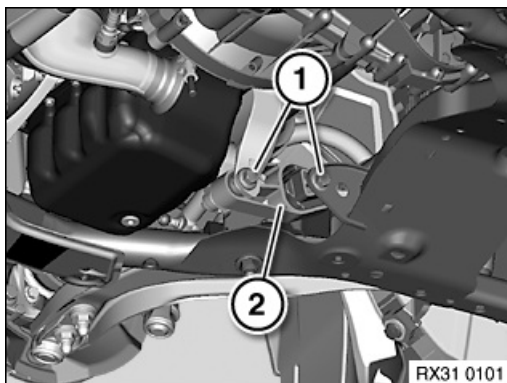


Remove Guide sleeve (1).

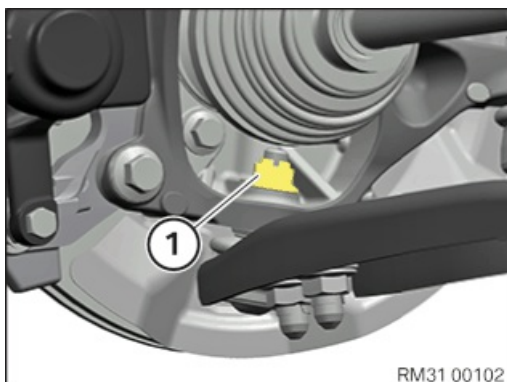


Push in the output shaft (1) in the automatic transmission.
Tighten down screws (2).
Tightening torque 31 60 1AZ.





Position the anti-roll bar link (2).
Tighten down screws (1).
Tightening torque 22 11 6AZ/ 9AZ



Keep wheel control joint to swivel bearing connection clean and free from oil and grease.
Position wheel guide joint on swivel bearing .
Replace nut (1).
Parts: Nut
Tighten nut (1).
Tightening torque 31 12 2AZ.



After installation:

- Connect battery earth lead.
- Check and if necessary, top up the oil level in the automatic transmission.
- Install front right wheel.



**Important!**

After completion of work, check transmission oil level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 litres.

**Important!**

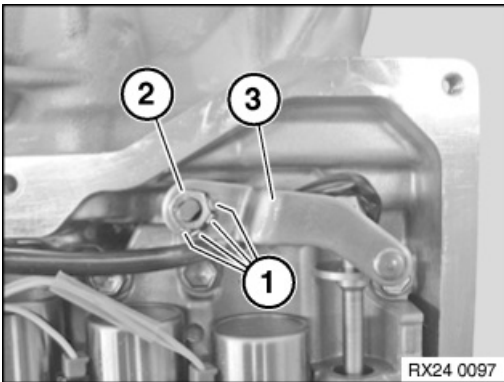
Use only the approved automatic transmission oil in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain oil before the transmission has cooled down.

**Necessary preliminary tasks:**

- Remove transmission oil sump
- Remove transmission oil strainer

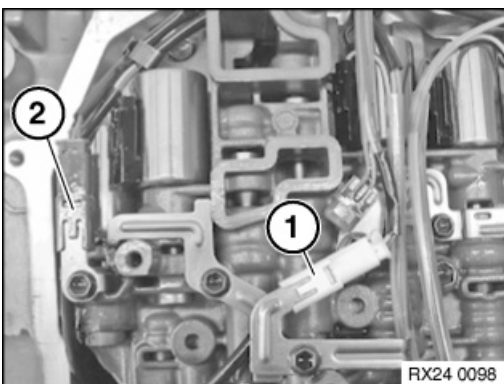


Bend open retaining lugs (1) of hand valve lever.

Slacken nut (2).

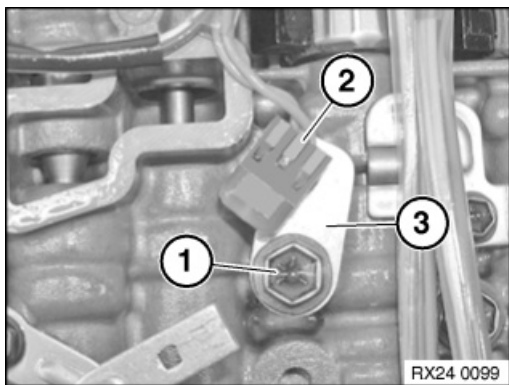
Tightening torque: 24 11 17AZ.

Remove hand valve lever (3).



Release connectors (1/2) from holders and disconnect.





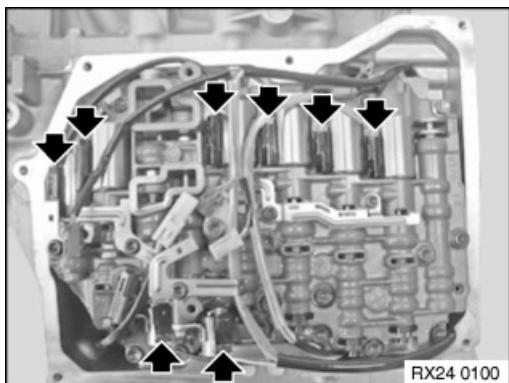
Release screw (1).

Tightening torque: 24 11 17AZ.

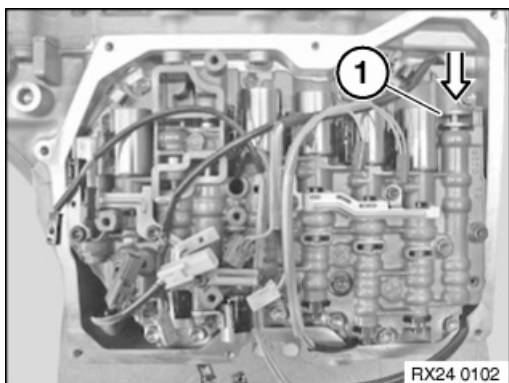
Remove oil temperature sensor (2) with locking plate (3).

Installation note:

Moisten seal with ATF.

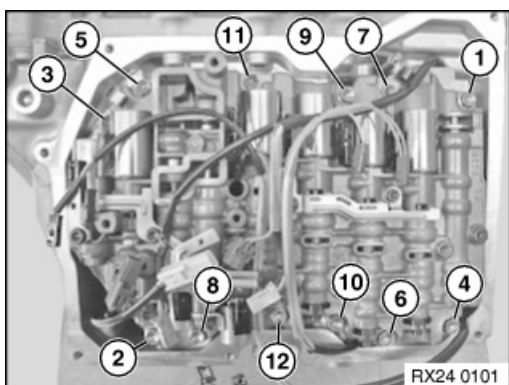


Disconnect plugs of magnet and pressure valves. *Installation note:*
Pay attention to routing of cables.



Important!

When removing selector unit, slide in gear selector valve (1) and hold down.



Important!

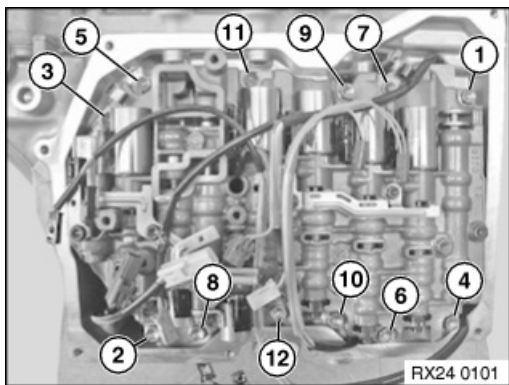
Screws have different lengths.

Numbers: 4,6,10,12=28 mm.

Numbers: 2,3,5,7,8,11=21 mm.

Numbers: 1,9=16 mm.

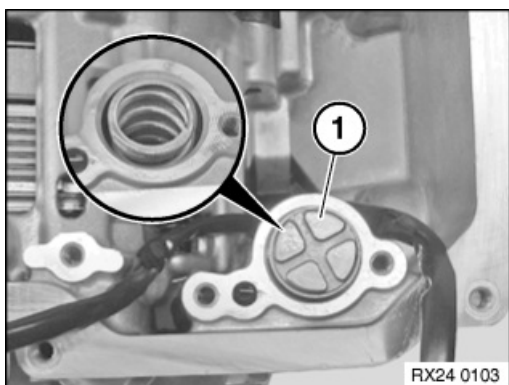




First release screws uniformly in specified order and then remove.
Remove selector unit.

Installation note:

Pay attention to installation location of cable clip and cables.



Important!

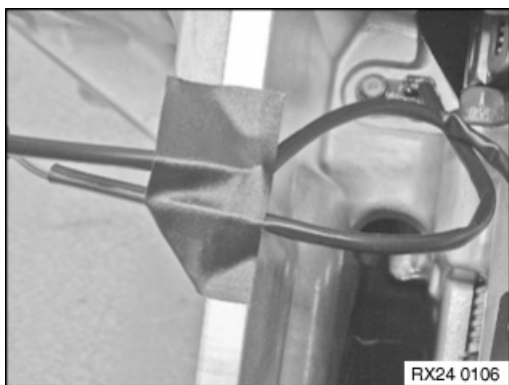
Under the selector unit at the end of the gear selector lever is the accumulator plunger (1) with spring.

Hold accumulator plunger (1) and spring firmly when removing selector unit.

Installation note:

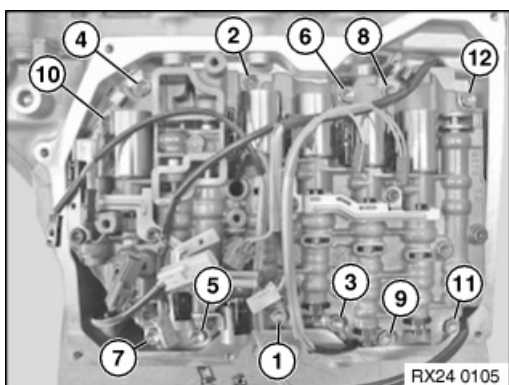
Moisten accumulator plunger and spring with ATF.

Install selector unit, accumulator plunger and spring simultaneously.



Installation note:

Before installing selector unit, secure cable with adhesive tape in installation location on housing.



Important!

Insert screws slightly during installation, align selector unit and tighten down in specified order.

Jointing torque and angle of rotation must be observed.

Tightening torque: 24 11 18AZ.





Attention!

After completion of work, check gearbox oil level.

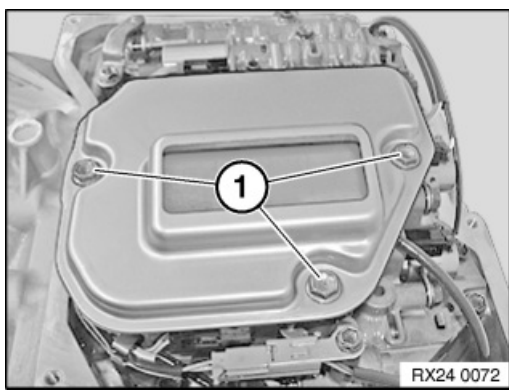
Use only the approved transmission oil.

Failure to comply with this requirement will result in serious damage to the automatic transmission!



Necessary preliminary work:

- Remove gearbox oil sump



Release screws (1).

Remove oil strainer.

Tightening torque 24 11 10AZ.

Installation note:

Clean contact surfaces.



24 11 012 Removing and installing/sealing or replacing transmission oil sump (AISIN)



Important!

- Do not let skin come in contact with transmission oil and do not inhale fuel vapours.
- Wear protective gloves.
- Ensure adequate ventilation.



Important!

Remove transmission oil sump only after it has cooled down.

After completion of repair work, check transmission oil level.

Use only the approved automatic transmission oil in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage!

Note:

Record the quantity of drained transmission oil.

Required replenishment quantity approx. 4.5 litres.



Recycling:

Catch and dispose of escaping automatic transmission fluid.

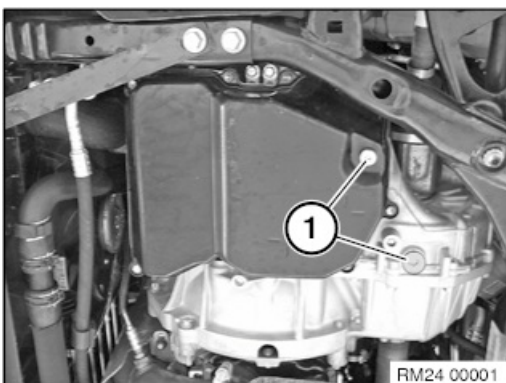
Observe country-specific waste disposal regulations.



Necessary preliminary tasks:

Secure engine in installation position.

Raise engine and transmission.



Remove underbody protection.

Release screws (1).

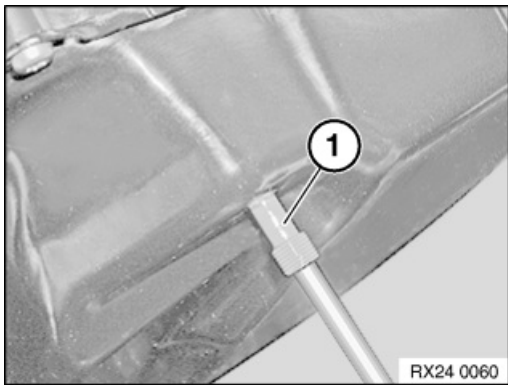
Drain off transmission fluid.

Installation note:

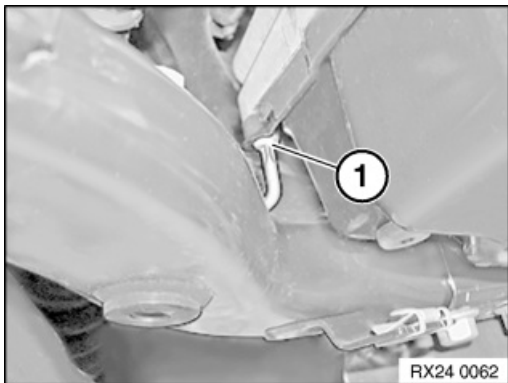
Tightening torque 24 11 1AZ.

Replace gaskets.





Screw sump tube (1) out of transmission oil sump and drain remaining transmission oil.



Release Torx screw (1).

Remove remaining mounting bolts from transmission oil sump and remove sump.

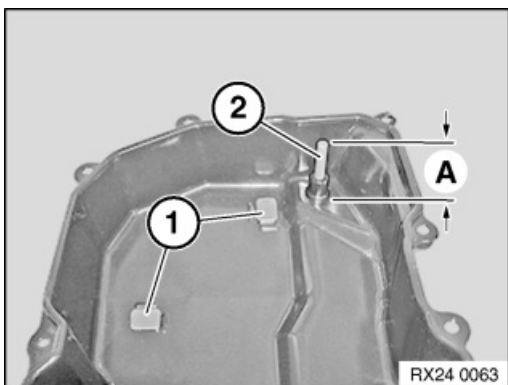
Remove oil sump gasket.

Clean sealing surfaces.

.Tightening torque 24 11 3AZ.

Installation note:

Replace gasket.



Clean sump magnets (1) and insert in new transmission oil sump.

Screw sump tube (2) into new transmission oil sump.

Measurement A: 37.35 – 38.05 mm

Tightening torque 24 11 1AZ.

Important!

Do not tighten sump tube too tightly.

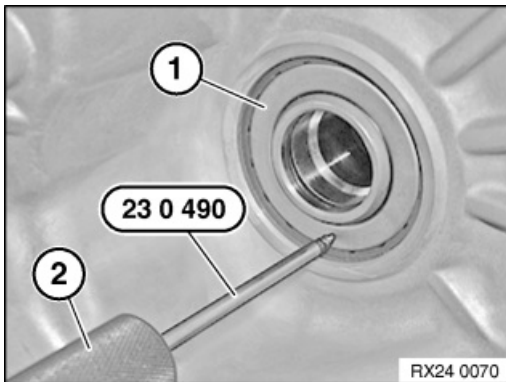


**Special tools required:**

- 23 0 490
- 24 4 300

**Necessary preliminary tasks:**

- Drain transmission fluid
- Remove left axle shaft



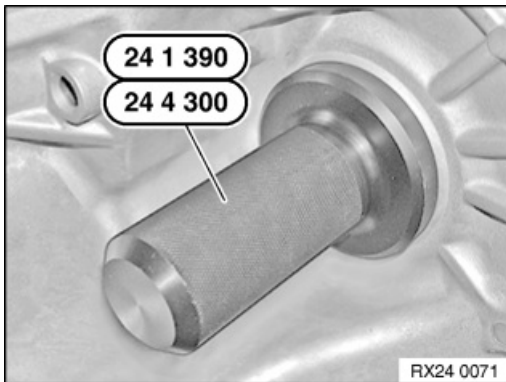
Drive a hole into radial shaft seal using a centre punch.

Important!

Do not use a drill as drillings may result in transmission malfunction.

Thread special tool 23 0 490 into radial shaft seal (1).

Drive out radial shaft seal (1) with impact weight (2).

**Installation note:**

Coat sealing lips of new radial shaft seal with clean transmission oil.

Radial shaft seal firmly home with special tool 24 4 300 .



24 21 230 Removing radial shaft seal of right axle shaft (AISIN) all-wheel drive vehicle N18



Special tools required:

- 24 0 210
- 24 0 220
- 24 0 230
- 24 0 240



Caution!

After completion of work check gearbox oil level and for leaks.

The vehicle must be parked on a level surface in the workshop to check the transmission oil level.

Use only the approved transmission oil.

Failure to comply with this instruction will result in serious damage to the transmission.



Recycling:

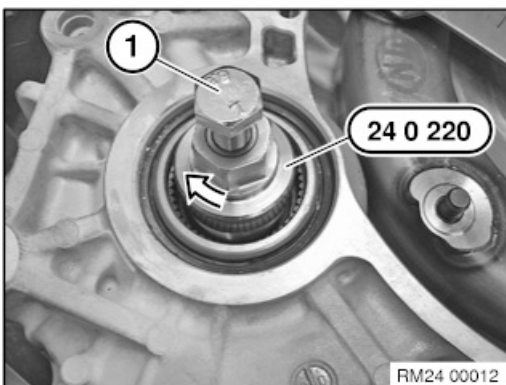
Catch and dispose of escaping transmission oil.

Observe country-specific waste disposal regulations.



Necessary preliminary work:

- Remove transfer box (PTO)
- Remove transmission



Screw in special tool 24 0 220 to the radial shaft seal (**small diameter**).

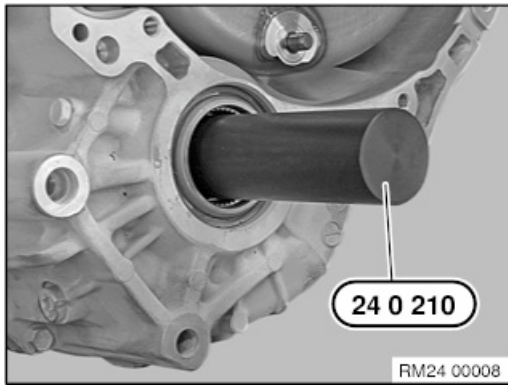
Screw in bolt (1) and pull out radial shaft seal.

Caution!

Risk of damage:

Damage to the gearbox housing will result in oil leaks!

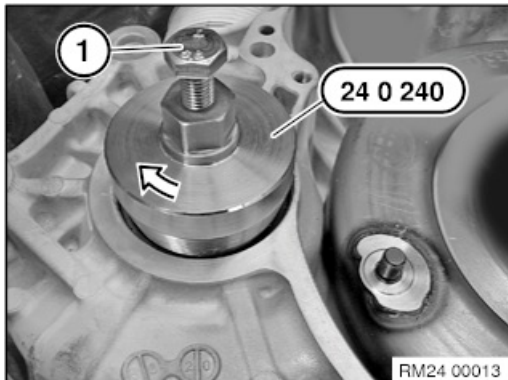




Installation note:

Coat sealing lips of new radial shaft seal with clean transmission oil.

Using special tool 24 0 210 drive in radial shaft seal (**small diameter**) into housing.



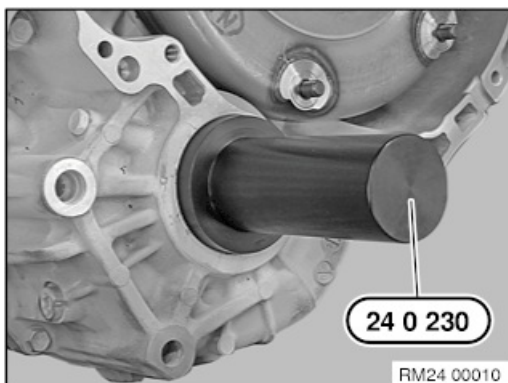
Screw in special tool 24 0 240 to the radial shaft seal (**large diameter**).

Screw in bolt (1) and pull out radial shaft seal.

Caution!

Risk of damage:

Damage to the gearbox housing will result in oil leaks!



Installation note:

Coat sealing lips of new radial shaft seal with clean transmission oil.

Using special tool 24 0 230 drive in radial shaft seal (**large diameter**) into housing.



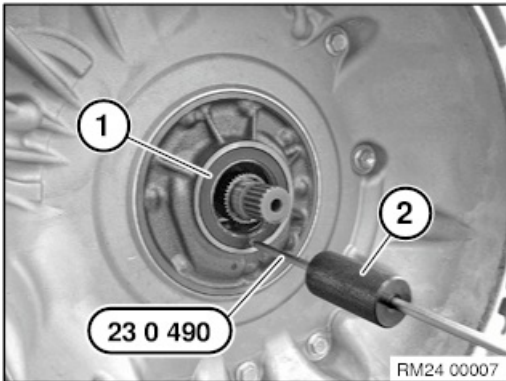
**Special tools required:**

- 23 0 490
- 24 4 250

*Note:*

Transmission removed!

Remove torque converter



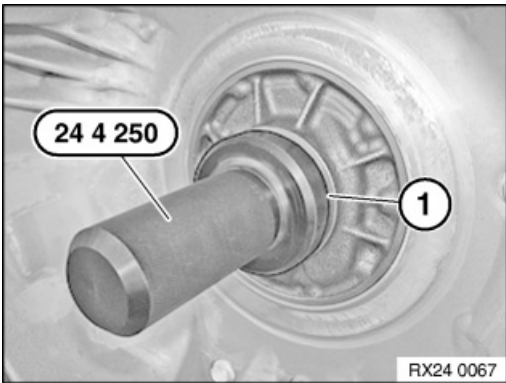
Drive a hole into radial shaft seal using a centre punch.

Important!

Do not use a drill as drillings may result in transmission malfunction.

Thread special tool 23 0 490 into radial shaft seal (1).

Drive out radial shaft seal (1) with impact weight (2).

*Installation note:*

Clean sealing surface.

Lubricate sealing lip of shaft seal with clean transmission oil.

Push radial shaft seal (1) onto special tool 24 4 250 and drive it in all the way. **Important!**

Do not damage shaft seal (1).



**Important!**

After completion of work, check transmission oil level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 litres.

**Important!**

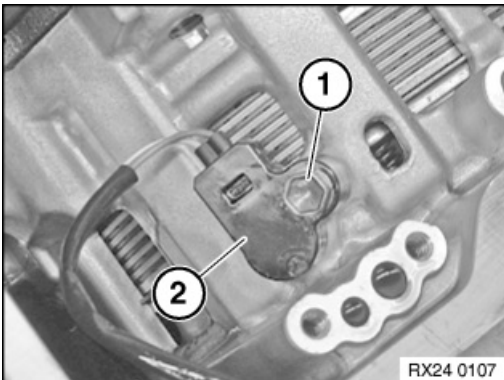
Use only the approved automatic transmission oil in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain oil before the transmission has cooled down.

**Necessary preliminary tasks:**

- Remove hydraulic shift unit



Release screw (1).

Tightening torque: 24 11 19AZ.

Remove sensor (2).



**Important!**

After completion of work, check transmission oil level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 litres.

**Important!**

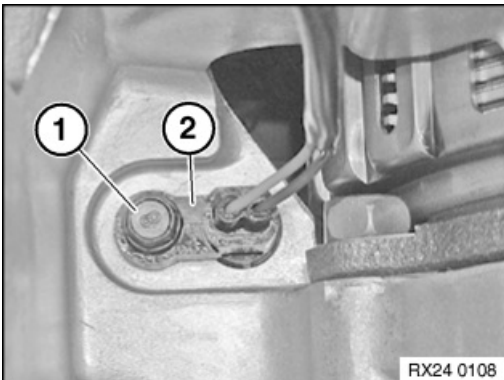
Use only the approved automatic transmission oil in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain oil before the transmission has cooled down.

**Necessary preliminary tasks:**

- Remove hydraulic shift unit



Release screw (1).

Tightening torque: 24 11 20AZ.

Remove sensor (2).

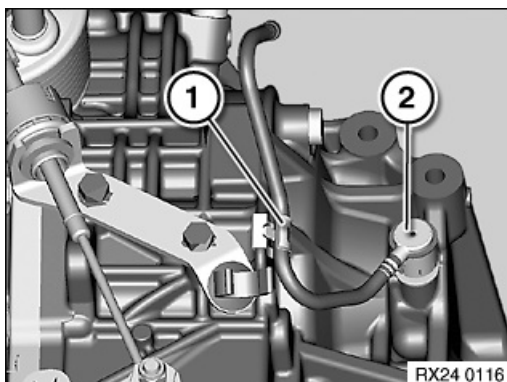


**Important!**

- Check breather for completeness after removal.
- Broken-off breather retaining lugs will result in serious damage to and failure of the automatic transmission.

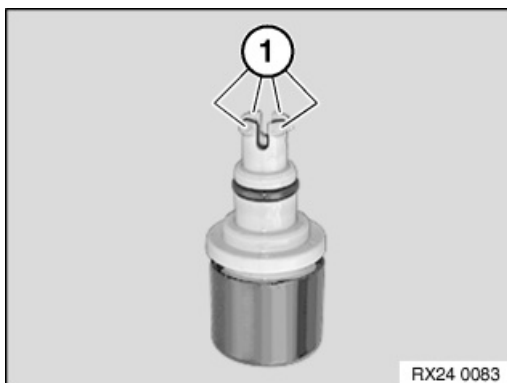
**Necessary preliminary work:**

Remove rubber mounts for gearbox mounting.



Remove hose from holder (1).

Lever breather (2) out of transmission housing with a suitable tool.



Check breather for completeness.

Retaining lugs (1) must not be broken off and be left behind in the transmission.



**Important!**

After completion of work, check transmission oil level.

Make a note of drained ATF quantity.

Required replenishment quantity approx. 4.5 litres.

**Important!**

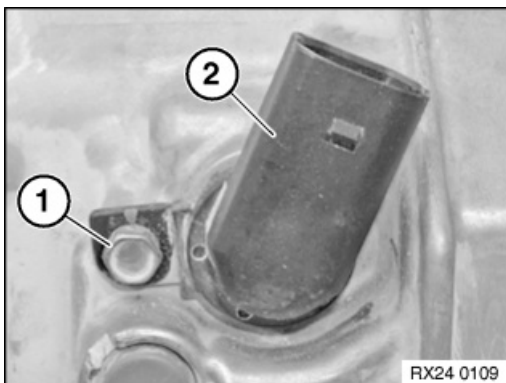
Use only the approved automatic transmission oil in this automatic transmission.

Otherwise the automatic transmission may incur extensive damage!

Do not drain oil before the transmission has cooled down.

**Necessary preliminary tasks:**

- Remove hydraulic shift unit



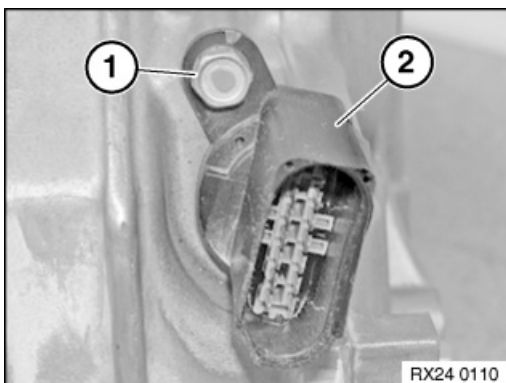
Release screw (1).

Disconnect multiple pin connector (2) of EGS control unit.

Tightening torque: 24 11 19AZ.

Installation note:

Coat O-ring with ATF.



Release screw (1).

Disconnect multiple pin connector (2) of EGS control unit.

Tightening torque: 24 11 19AZ.

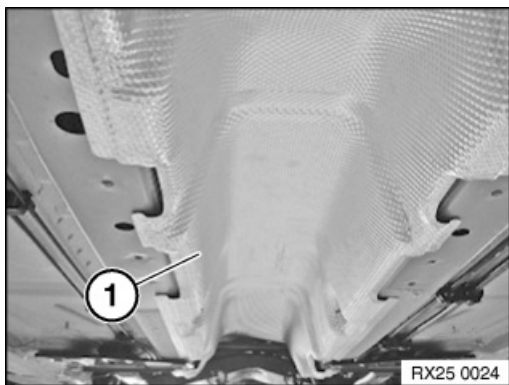
Installation note:

Coat O-ring with ATF.

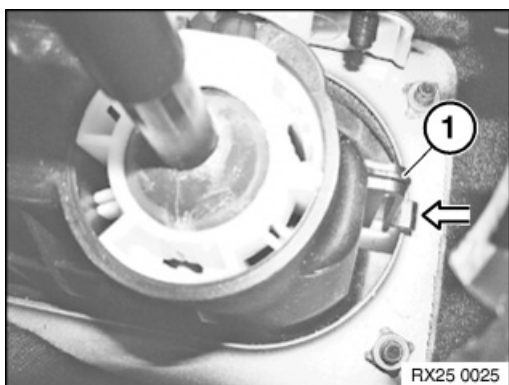


**Necessary preliminary work:**

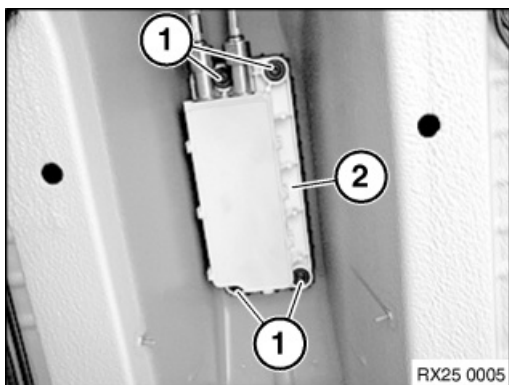
- Remove exhaust system
- Remove gearshift lever knob with gaiter



Remove heat shield (1).



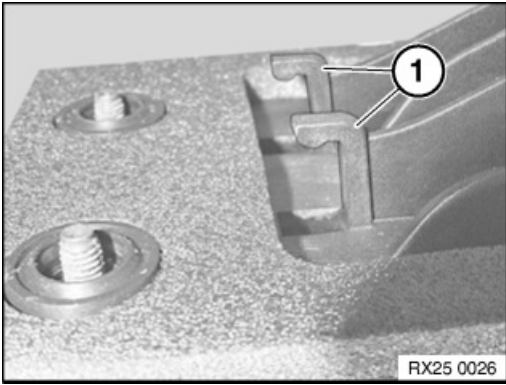
Release retaining clip (1).



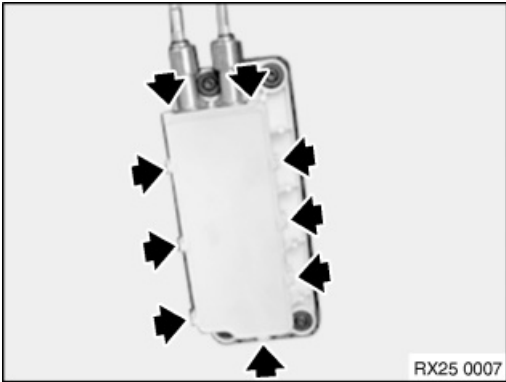
Release screws (1).

Pull off shift lever housing (2) towards rear.



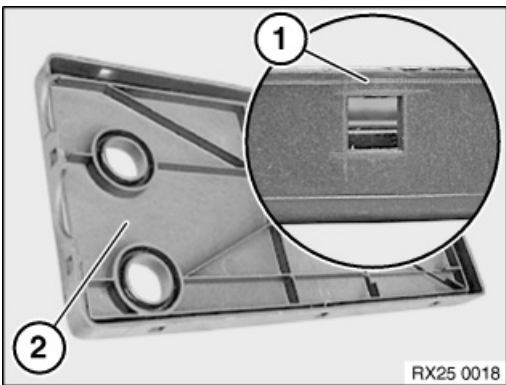


Installation note:
Front retaining lugs (1) of shift lever housing must first be fed into the vehicle underbody.

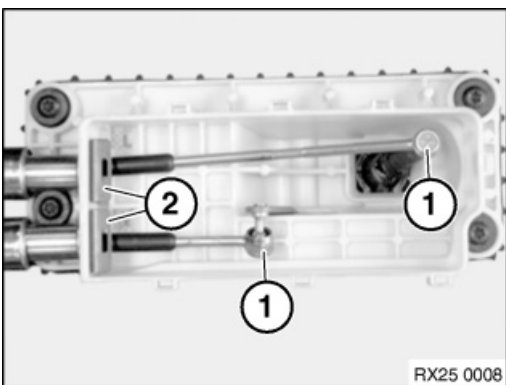


Important!
Do not damage the bridges of the latch mechanisms on the lid.

Lift out the latch mechanism and release shift lever cover.



Installation note:
The bridges (1) of the latch mechanisms on the lid (2) must not be damaged.
Replace seals if defective.



Use suitable pliers to detach gear selector cable assemblies (1).
Remove clips (2) and pull gear selector cable assemblies out of housing.





Note:

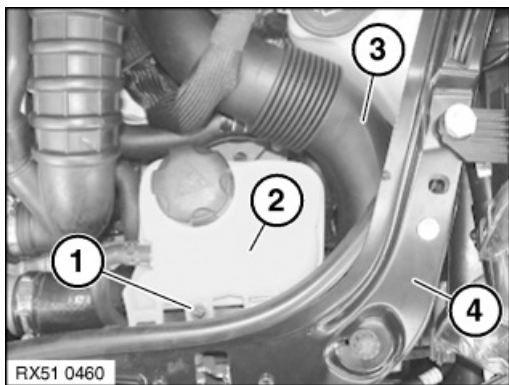
Operation is identical to:

- Replace gear selector cable assemblies

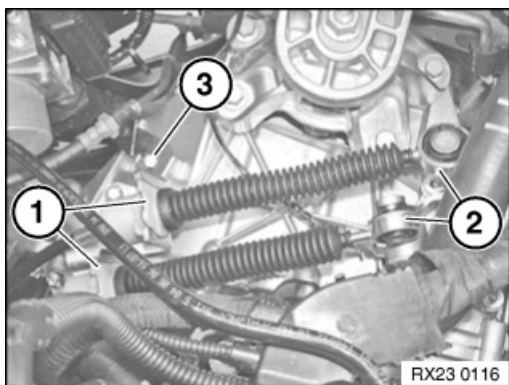


**Necessary preliminary work:**

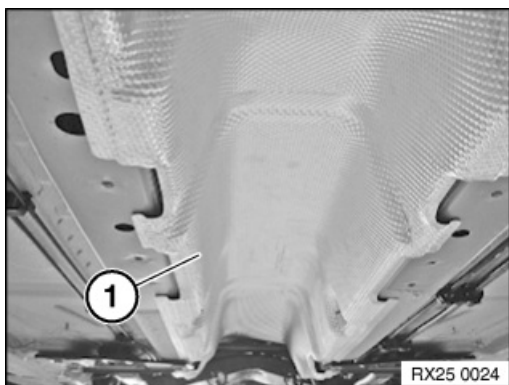
- Detach gear selector cable from gearshift bracket
- Remove intake silencer housing



Undo bolt (1) and place coolant expansion tank (2) to one side.
Remove intake pipe (3).

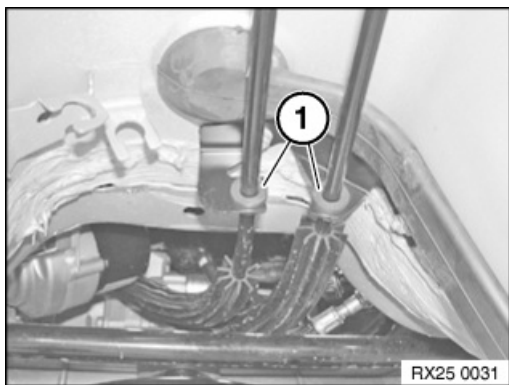


Release clips on limit position/holder (1).
Release retaining clips and detach gear selector cables (2) at ball joints.



Remove heat shield (1).

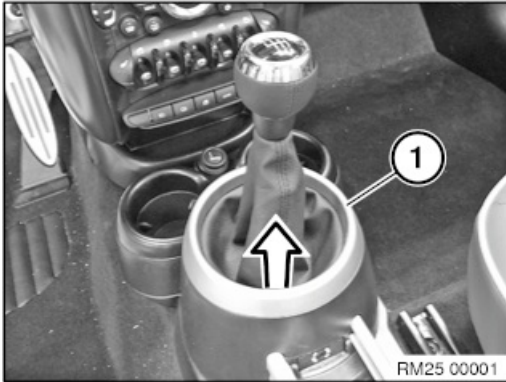




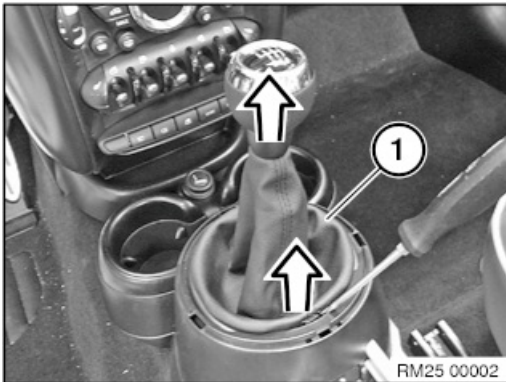
Detach gear selector cable (1) from floor panel.



25 11 071 Replacing gearshift lever knob



Detach trim cover (1) in upward direction.



Use suitable tool to release gaiter retainers (1).

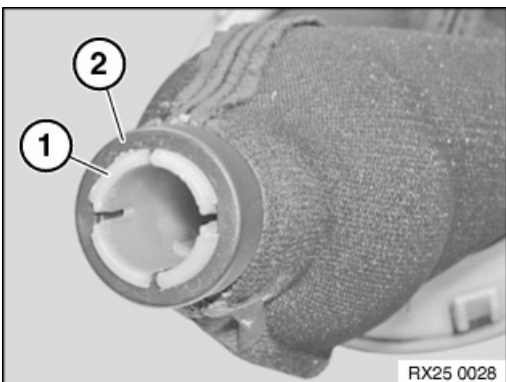
Tug firmly to remove knob.

Note:

- Do not twist knob during removal as this would cause the anti-twist lock in the knob to shear off.

Installation note:

- Fit knob on gearshift lever, align and press on until it snaps noticeably into place.



Pull gaiter over gearshift lever knob.

Release retaining lugs (1).

Detach gaiter (2) from gearshift lever knob.

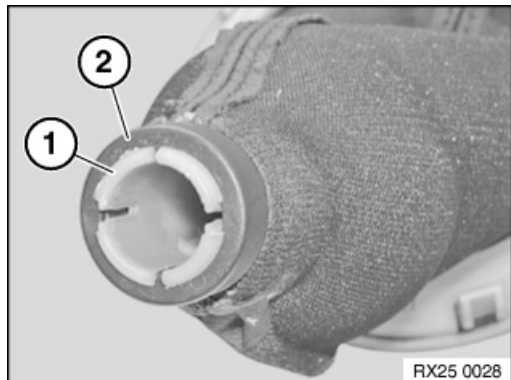


25 11 081 Replacing shift lever cover



Necessary preliminary work:

- Remove shift lever knob



Pull gaiter over shift lever knob.

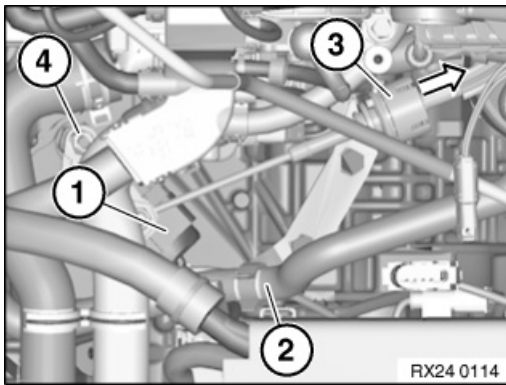
Press retainers (1) inward to release.

Remove gaiter (2) from shift lever knob.

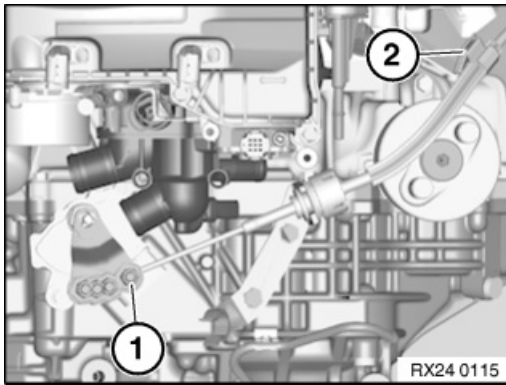


**Necessary preliminary tasks:**

- Move selector lever into "P" position
- Remove selector lever grip
- Remove storage compartment
- Remove intake silencer housing
- Remove exhaust system
- Remove intake silencer housing gaiter.
- Remove heat shield
- Remove cable from holder on vehicle underbody

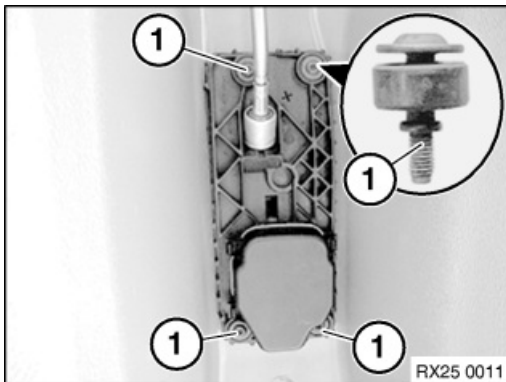


Slide retaining sleeve for cable (3) in direction of arrow.
Remove cable from holder.



Release cable lock nut (1).
Remove cable from holder (2).
Tightening torque 24 11 8AZ.

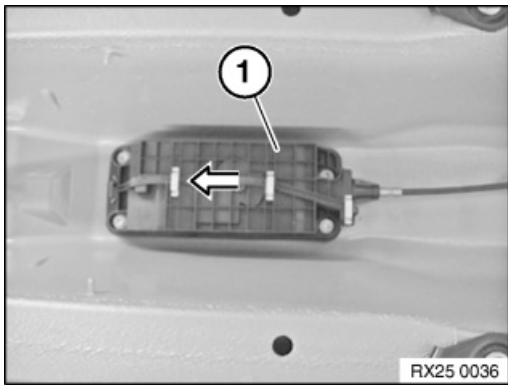
Installation note:
Adjust selector lever.



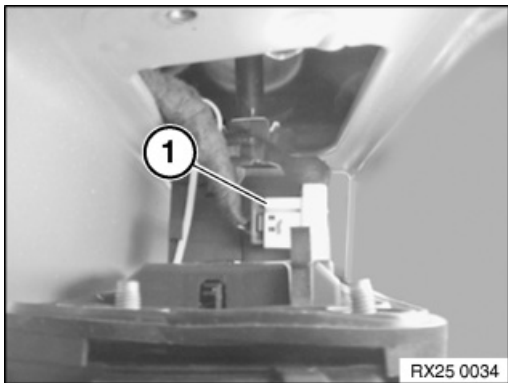
Remove mounting bolts (1) of gear shift housing.
Tightening torque 25 16 2AZ.

Note:
Graphic similar.





Press gearshift bracket (1) in direction of arrow.
Fold gearshift bracket downwards.



Disconnect plug connection (1) and remove gearshift bracket.



Important!

An incorrectly adjusted gearshift mechanism can result in tooth meshing noise being transmitted to the passenger compartment.

Installation note:
Adjust selector lever.



Installation note:
Move selector lever to "P" position.
Check whether parking lock is engaged by turning output shaft.



**Important!**

After completion of work, check gearbox oil level.

Use only the approved transmission oil.

Failure to comply with this requirement will result in serious damage to the automatic transmission!

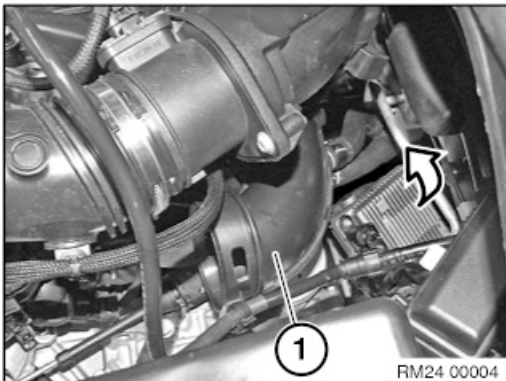
Important!

No dirt is allowed to enter the oil circuit.

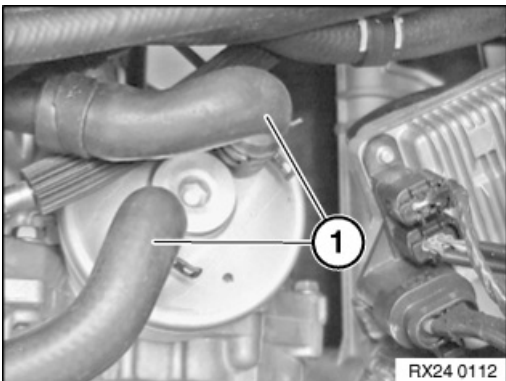
Failure to comply with this requirement will result in serious damage to the automatic transmission!

**Necessary preliminary work:**

- Drain coolant
- Remove coolant expansion tank
- Remove intake silencer housing gaiter.
- Remove intake pipe (N18)
- Remove intake silencer housing (N16)
- Partially detach gear selector cable



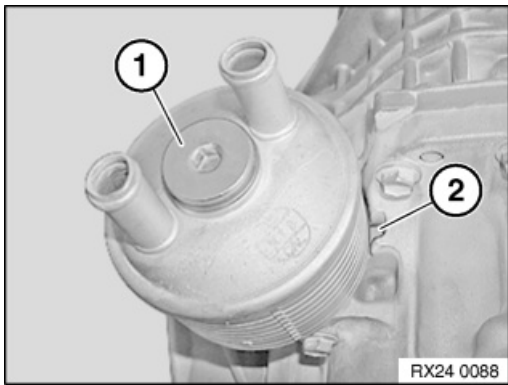
N18: Turn intake pipe (1) anti-clockwise and remove.



Unfasten hose clamps.

Detach coolant hoses (1) from transmission oil cooler.



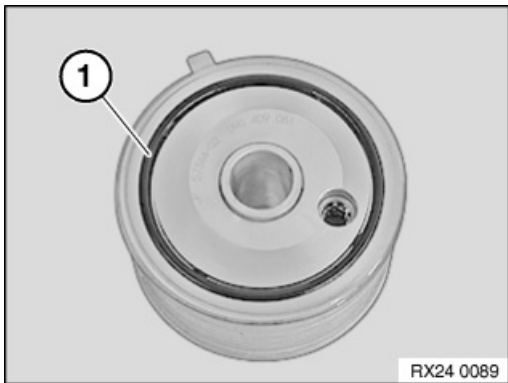


Release screw (1).

Tightening torque 24 11 11AZ.

Installation note:

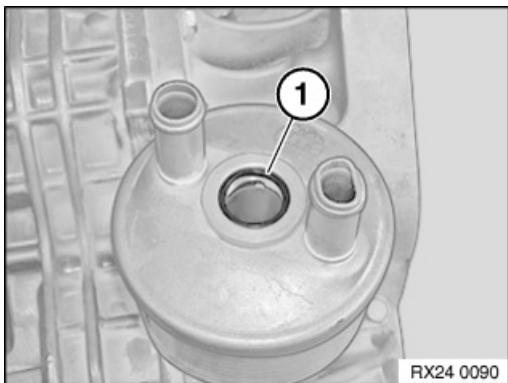
Pay attention to position lug (2).



Replace sealing ring (1). *Installation note:*

Clean contact surfaces.

Moisten sealing ring (1) with clean transmission oil.



Replace sealing ring (1). *Installation note:*

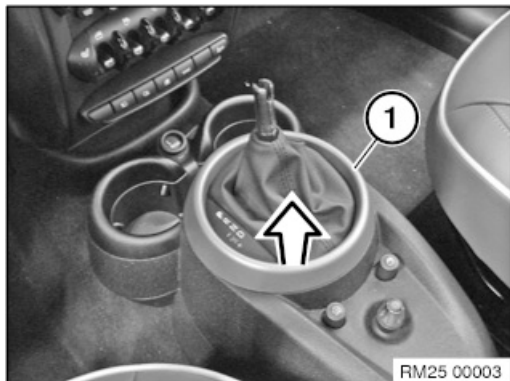
Clean contact surfaces.

Moisten sealing ring (1) with clean transmission oil.

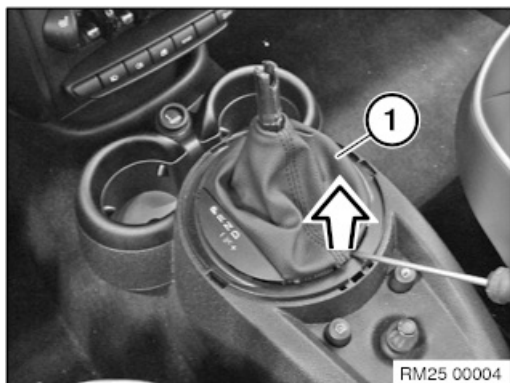


**Necessary preliminary work:**

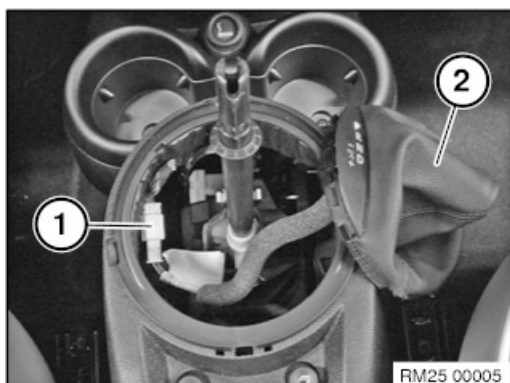
- Remove grip



Detach trim cover (1) in upward direction.

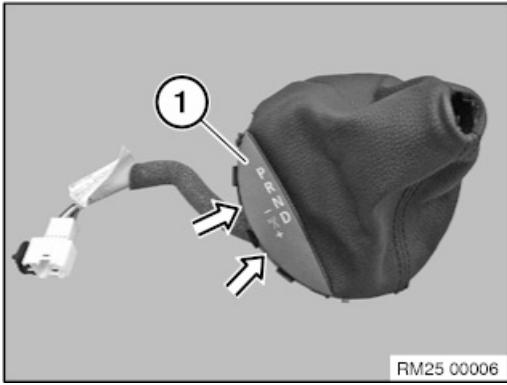


Use suitable tool to release gaiter retainers (1).
Pull off gaiter upwards.

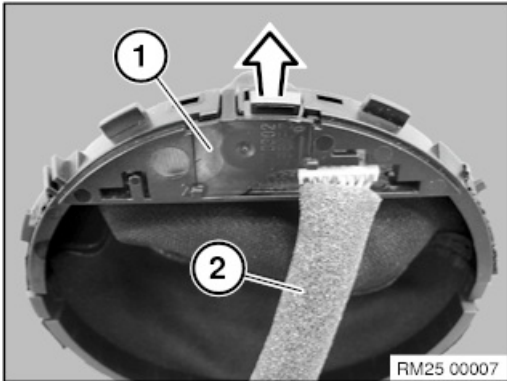


Release plug connection (1) on holder and disconnect.
Remove gaiter (2).





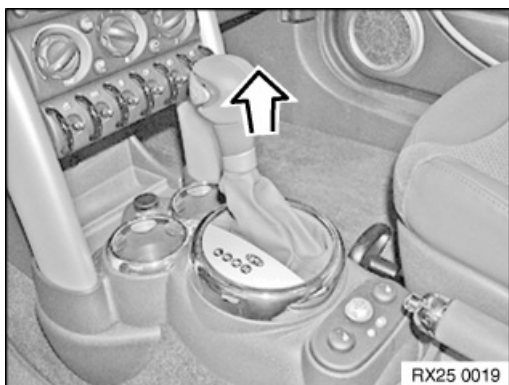
Release retainers and remove trim cover (1).



Remove cover (1) in direction of arrow and feed out wiring harness (2) with display.



25 16 061 Selector lever grip



Note:

- Do not twist knob during removal as this would cause the anti-twist lock in the knob to shear off.

Tug firmly to remove knob.

Installation note:

- Fit knob on selector lever, align and press on until it snaps noticeably into place.

Note:

Graphic similar.

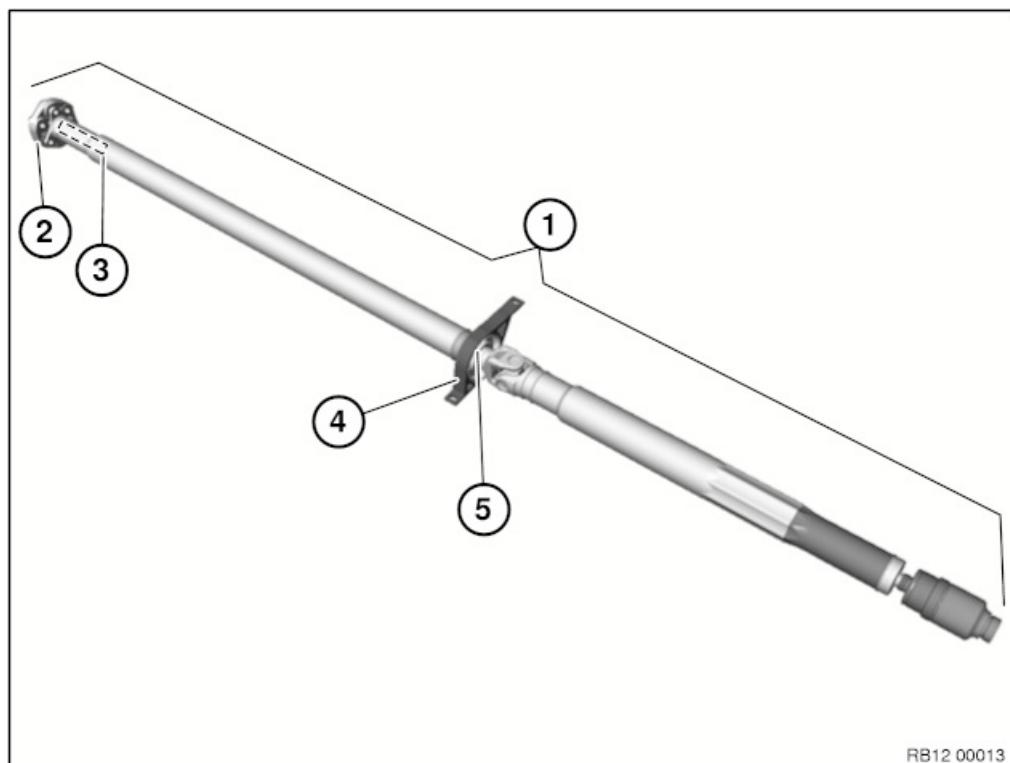




Note:
Troubleshooting with DIS Tester.



26 11 ... Overview (inserted propeller shaft)



- 1 Complete propeller shaft
- 2 Flexible disc
- 3 Centring mount
- 4 Centre mount
- 5 Grooved ball bearing





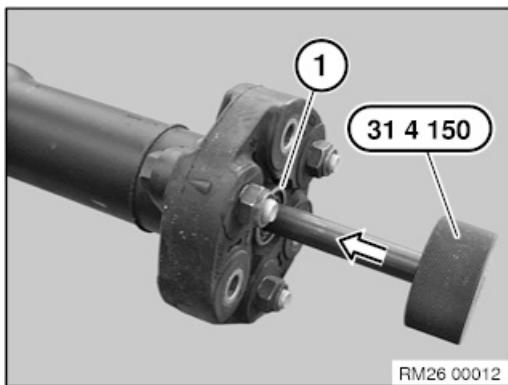
Special tools required:

- 31 4 150
- 11 2 030
- 00 5 500



Necessary preliminary work:

- Remove propeller shaft.

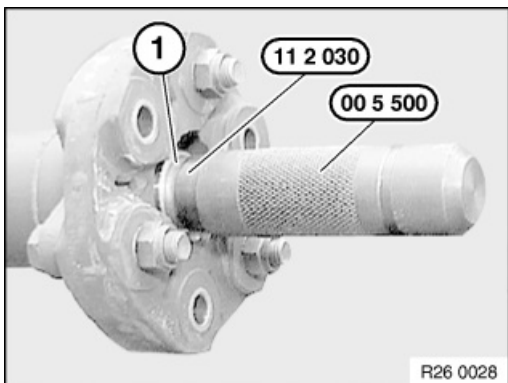


Completely fill centring bore hole (1) with viscous grease.

Drive special tool 31 4 150 with a plastic hammer into centring bore hole.

The centring bearing (1) is forced out of the propeller shaft by the pressure on the grease filling.

If necessary, top up grease repeatedly.



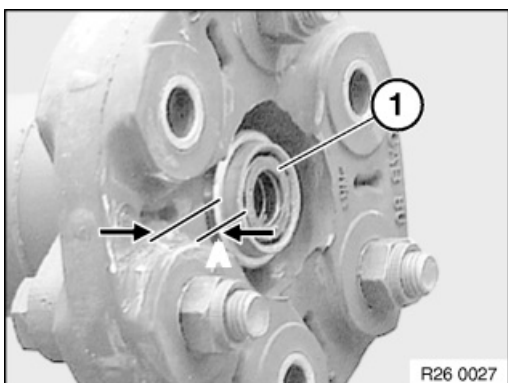
Installation note:

Remove grease from bearing hole.

Drive in centring mount (1) with special tools 11 2 030 and 00 5 500 into propeller shaft (observe protrusion).

Grease centring mount.

- Grease: BMW Service Operating Fluids.



Installation note:

Observe protrusion A = 7 mm of centring element (1).



**Special tools required:**

- 00 9 120
- 00 9 130
- 33 5 070
- 33 0 080

**Important!**

The inlay nut on the transfer box must be replaced!

The sunk nut already has a screw locking.

After the propeller shaft has been screwed into the transfer box (inlay nut), a **minimum hardening time of 2 hours** must be complied with.

The hardening time may be extended at lower temperatures!

Failure to comply with these instructions may cause serious damage!

**Necessary preliminary work:**

- Remove complete exhaust system
- Remove exhaust bracket and stiffening strut
- Remove heat shields

**Important!**

Adhere without fail to the installation and bolt-tightening sequence.

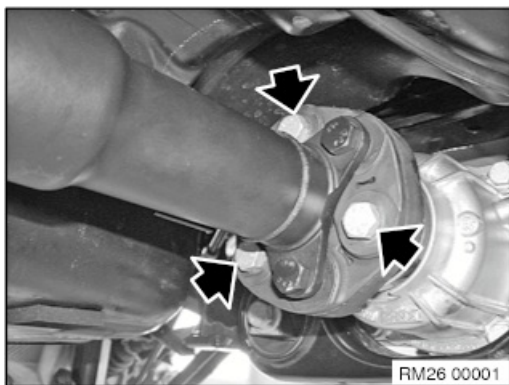
Installation sequence:

1. Join propeller shaft to rear axle final drive
2. Join propeller shaft to transmission
3. Join centre mount

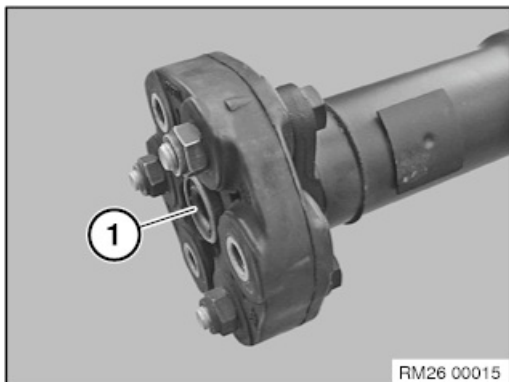
Screw-fastening sequence:

1. Insert nut
2. Flexible disc to rear axle final drive
3. Centre mount

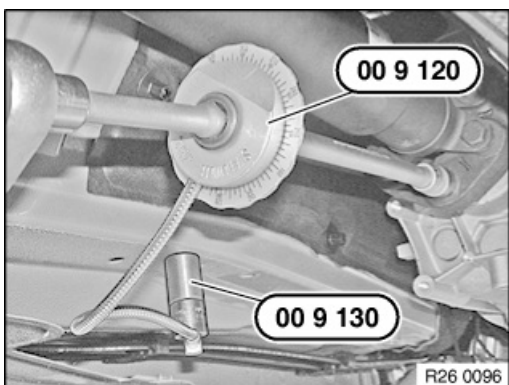




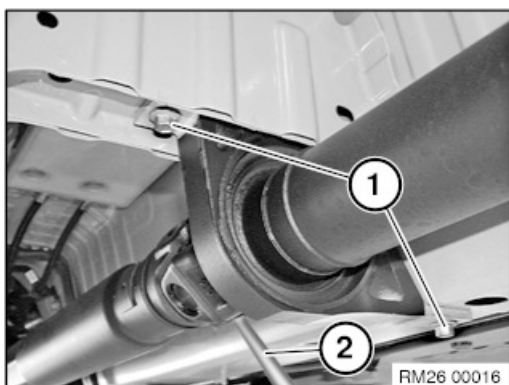
Release screws. *Installation note:*
Replace ZNS bolts and self-locking nuts.



Installation note:
Check centring mount (1).
If necessary, replace damaged centring.

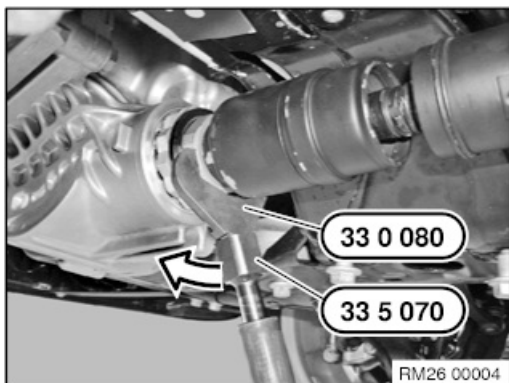


Installation note:
Tighten down screws/bolts to specified torque.
Secure angle of rotation special tool 00 9 120 with magnets 00 9 130 to vehicle underbody and screw down further according to angle of rotation.
Tightening torque 26 11 2AZ.



Slacken screws (1)
Using a suitable tool (2), secure propeller shaft at centre universal joint against turning.
Remove screws of centre mount fully only after opening insert nut.
Tightening torque 26 11 4AZ.





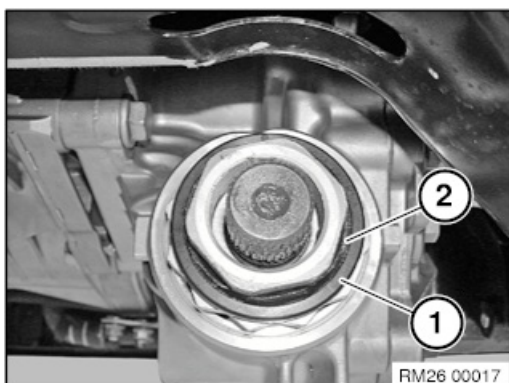
Important!

The bi-hexagonal flange nut must not be used for bracing.

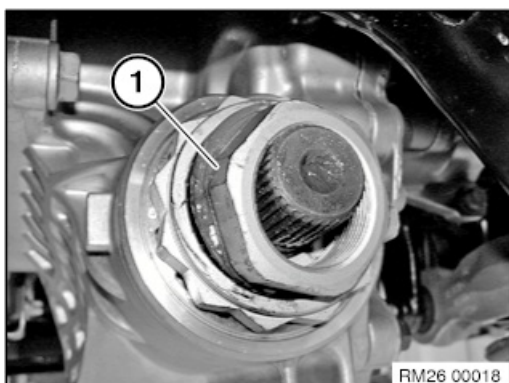
Failure to comply with this instruction may result in serious damage to the transfer box.

Release inlay nut **in clockwise direction** with special tool 33 5 070 and 33 0 080 .

Tightening torque 26 11 1AZ.



Remove retaining clip (1) and gasket (2). *Installation note:* Retaining clip and gasket must be replaced.

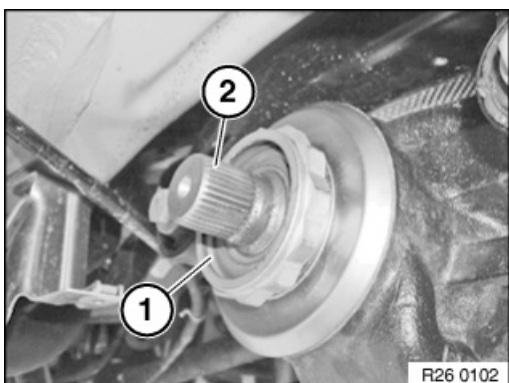


Remove insert nut (1). *Installation note:* Insert nut must be replaced.

The sunk nut is equipped with a screw locking.

Prior to the first journey, a **minimum hardening time of 2 hours** must be complied with.

Failure to comply with these instructions may cause serious damage!



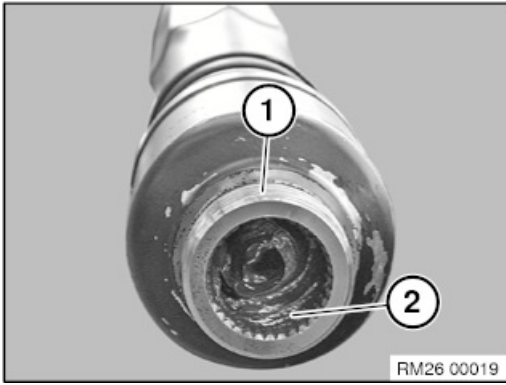
Before installing propeller shaft:

Clean insert collar (1) on flange nut and gearing on bevel pinion (2).

Fill insert collar (1) with grease.

Grease: BMW Service Operating Fluids.





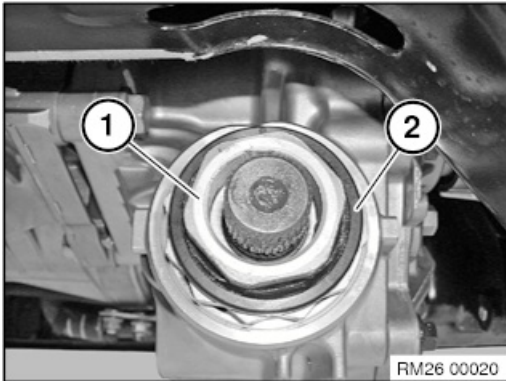
Clean thread (1) of joint hub to remove adhesive residues.

Hub gearing (2) must be greased.

Grease: BMW Service Operating Fluids.

Important!

Thread of joint hub must **not** be fouled with grease.



Place flange nut (1) with gasket in insert collar of flange nut.

Install retaining clip (2).



Important!

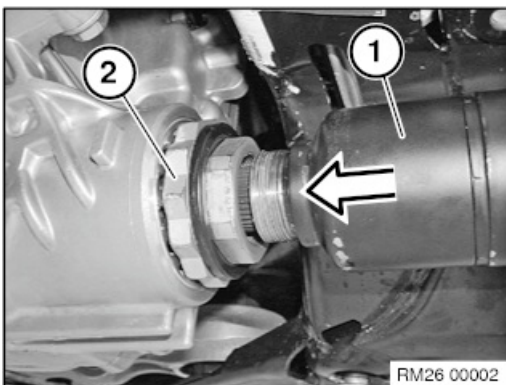
Adhere without fail to the installation and bolt-tightening sequence.

Installation sequence:

1. Join propeller shaft to rear axle final drive
2. Join propeller shaft to transmission
3. Join centre mount

Screw-fastening sequence:

1. Insert nut
2. Flexible disc to rear axle final drive
3. Centre mount



Important!

The bi-hexagonal flange nut (2) must not be used for bracing.

Failure to comply with this instruction may result in serious damage to the transfer box.

Insert nut must be screwed into place **within 5 minutes**.

Slide propeller shaft (1) to the limit position onto insert nut and secure.

Secure propeller shaft at centre universal joint against turning with a mounting lever.

Tightening torque 26 11 1AZ.



26 11 000 Removing and installing propeller shaft completely \PREMIUM

PRELIMINARY WORK

1 – Remove complete exhaust system



WARNING

Hot surfaces.

Risk of burning!

- Perform all work only on components that have cooled down.



CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.

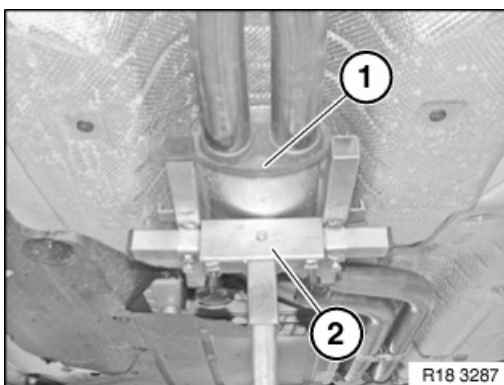


CAUTION

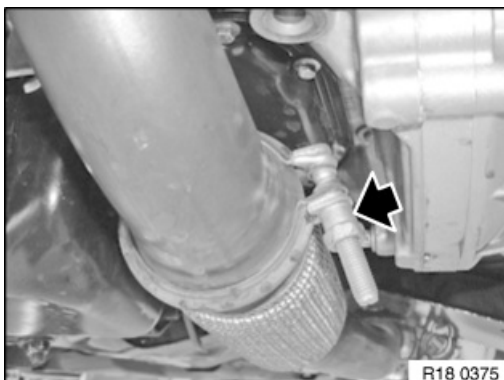
Heavy component.

Heavy components can lead to injury or damage.

- Remove and install heavy components with the aid of another person/other persons.

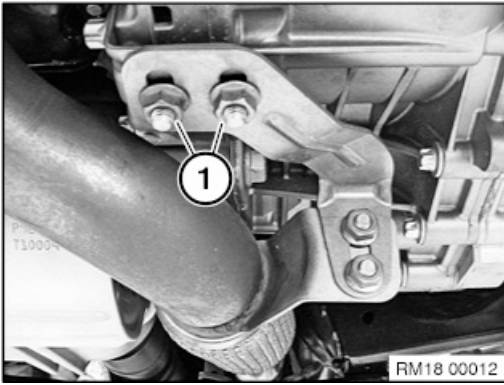


- Support the exhaust system (1) with a suitable jack (2).

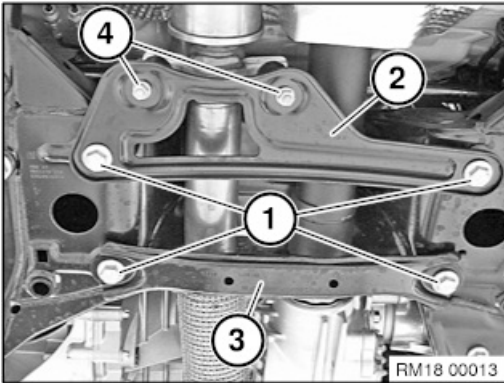


- Unfasten the clamp (arrow).

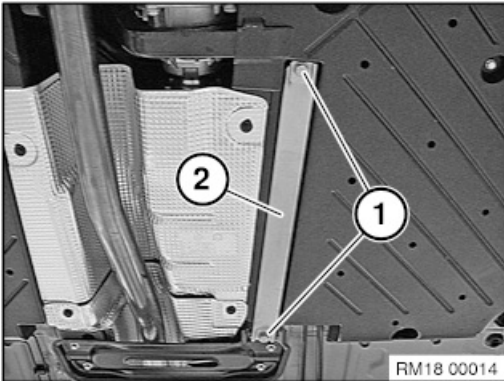




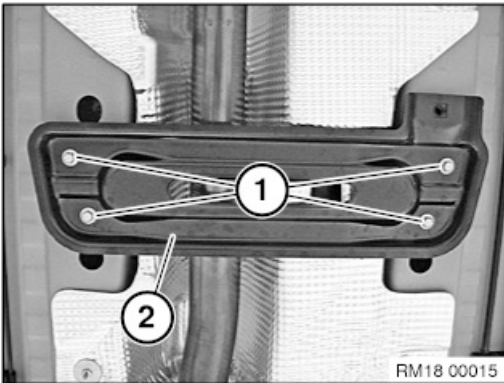
- Loosen nuts (1).



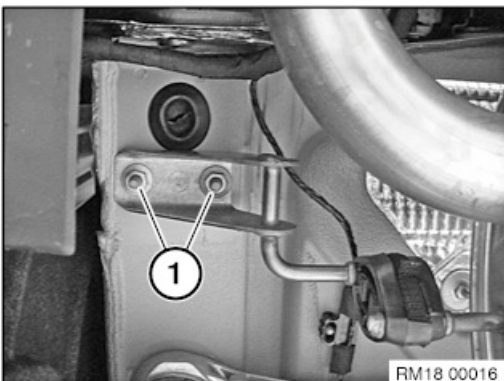
- Loosen screws (1).
- Remove the bracing plate (2) and the bracing strut (3).
- When replacing the exhaust system: Loosen nuts (4).



- On vehicles with all-wheel drive:
Loosen screws (1).
Remove the bracing strut (2).



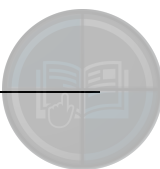
- Loosen screws (1).
- Remove reinforcement plate (2).



- Unscrew the nuts (1) on the left and right on the rear silencer.
- Lower and remove exhaust system with assistance of a second person.

MAIN WORK

2 – Completely install the propeller shaft (inserted)



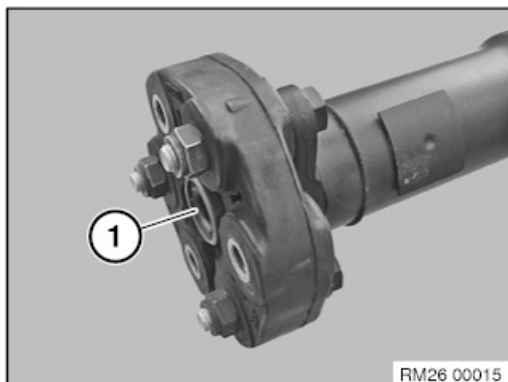


RISK OF DAMAGE

Damage to the propeller shaft during installation.

Non-observance of the installation guidelines for the propeller shaft on the rear axle differential may cause severe damage.

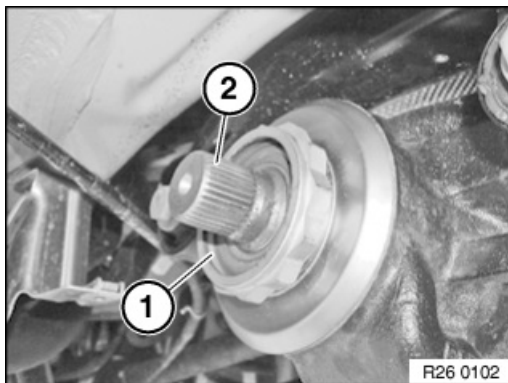
- Always renew the recessed nut on the rear axle differential. Screw locking must be available.
- Strictly observe a minimum hardening time of two hours after having screwed in the recessed nut. The hardening time may be longer at lower temperatures.



- Check the centring (1) for damage and replace if necessary.
- Grease centring (1).

Expendable materials

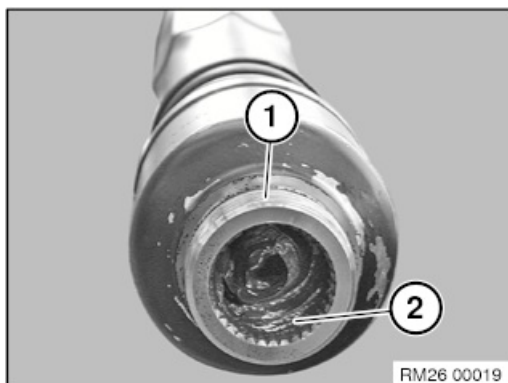
Lubricating grease Olistamoly 2 LN 584 LO	100 g, Tube	83 19 0 447 919
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- Clean all residue from the insert collar (1) of the flange nut and the gearing on the bevel pinion (2) and degrease them.
- Top up the collar insert (1) with grease.

Expendable materials

Lubricating grease Optitemp HT 1 LF	50 g, Tube	83230417754
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RISK OF DAMAGE

Damage to the output flange.

Failure to observe the greasing specifications may lead to damage on the output flange.

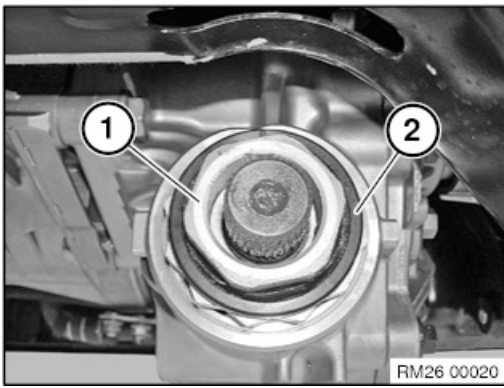
- Do not contaminate the thread of the output flange with grease.

- Clean adhesive residue from the thread (1) of the propeller shaft hub.
- Clean the hub gearing (2).
- Greasing the hub gearing (2) is imperative.

Expendable materials

Lubricating grease Optitemp HT 1 LF	50 g, Tube	83230417754
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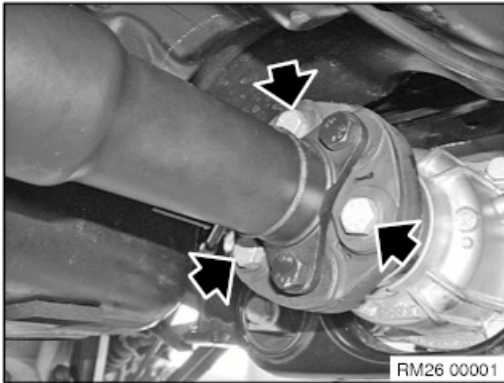




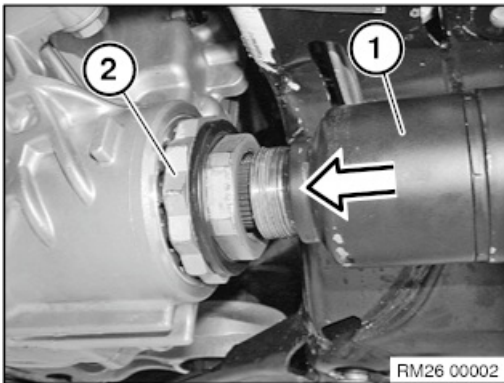
- Renew the seal, recessed nut (1) and the mounting clip (2).

Parts: Seal, recessed nut (1) and mounting clip (2)

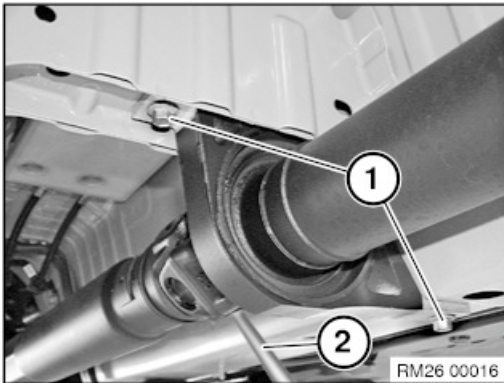
- Insert the recessed nut (1) with the gasket into collar insert of the flange nut.
- Install the mounting clip (2).



- Position the screws and nuts, if applicable (arrows).

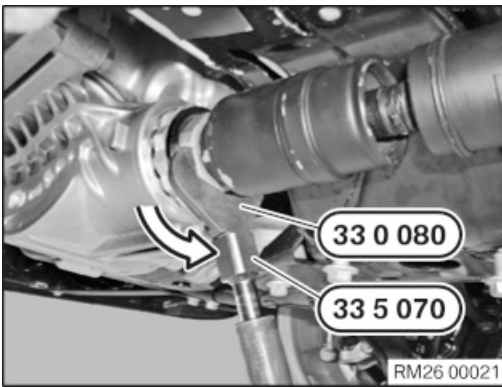


- Push on propeller shaft (1) up to the limit position on the recessed nut.
- Screw the recessed nut at least 2 threads onto the propeller shaft (1) by hand and tighten it.



- Position centre mount.
- Position screws (1).





- Secure the propeller shaft against twisting at the central universal joint using a suitable tool.



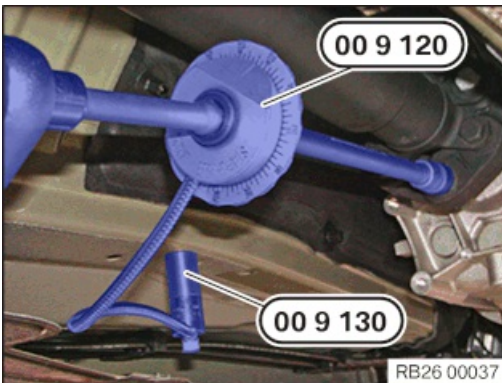
RISK OF DAMAGE

Damage to the flange nut.

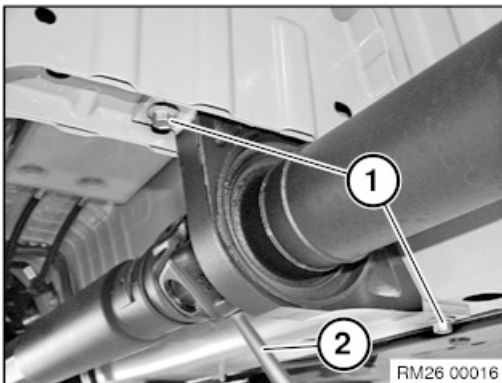
Failure to observe the installation specifications may lead to serious damage to the flange nut and the rear axle differential.

- Do not use the double hexagon flange nut as counter support.
- Screw in the recessed nut within 5 minutes.

- Screw in the recessed nut counter-clockwise with the special tools [0 496 959 \(33 0 080\)](#) and .



- Provide counter support for the bolts of the flexible disc on the nut and tighten.
- Mount the special tool [0 490 504 \(00 9 120\)](#) on the vehicle underbody with the special tool [0 495 108 \(00 9 130\)](#) and screw it in according to the angle of rotation.



- Tighten the screws (1).
- Remove the tool (2) to secure the propeller shaft.

POSTPROCESSES

3 – Installing the complete exhaust system



CAUTION

Component with heavy weight.

Danger of injury!

- Note component's centre of gravity.
- Support component using a jack.
- Secure component against falling off the jack.



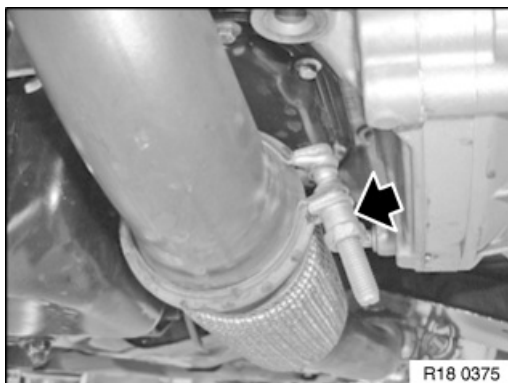


CAUTION

Heavy component.

Heavy components can lead to injury or damage.

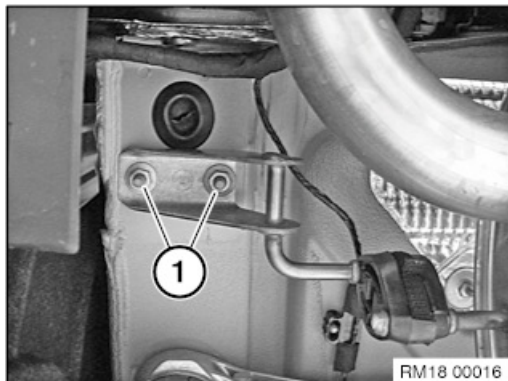
- Remove and install heavy components with the aid of another person/other persons.



- Install the exhaust system with a second person.
- Tighten the clamp (arrow).

V-band clamp, exhaust system, to catalytic converter

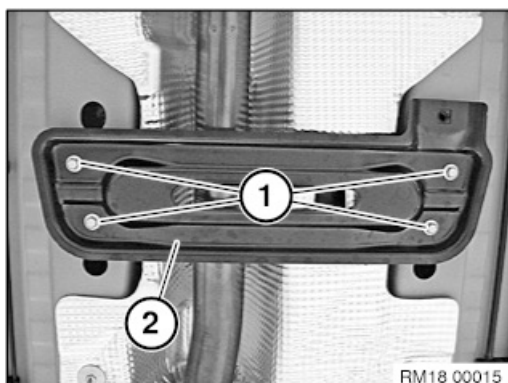
V-band clamp			25 Nm
--------------	--	--	-------



- Tighten the nuts (1) on the left and right on the rear silencer.

Exhaust system to body

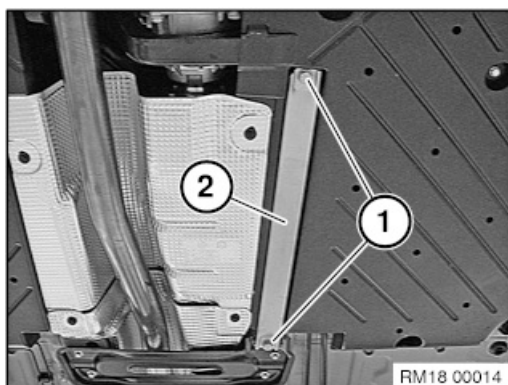
Nut	M8		21,4 Nm
-----	----	--	---------



- Install the reinforcement plate (2).
- Tighten the screws (1).

Reinforcement plate to body

Nut	M8		19 Nm
-----	----	--	-------

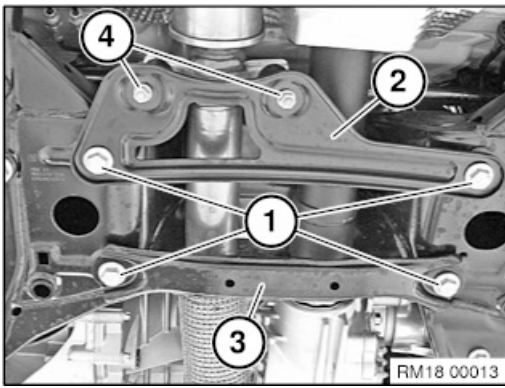


- On vehicles with all-wheel drive:
Install the bracing strut (2).
Tighten the screws (1).

Longitudinal struts to rear axle support/body

Bolts	M10		65 Nm
-------	-----	--	-------





- Install the bracing plate (2) and the bracing strut (3).
- When replacing the exhaust system: Tighten nuts (4).

Exhaust system to stiffening plate

Bolts	M8		19 Nm
-------	----	--	-------

- Tighten the screws (1).

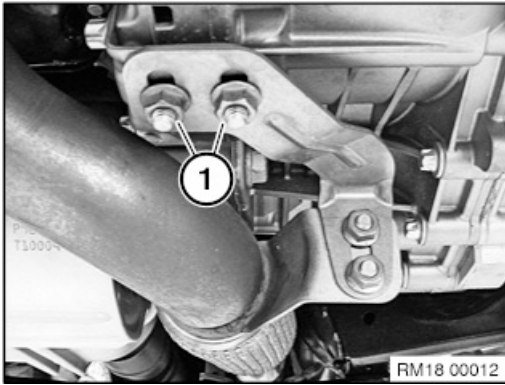
Reinforcement braces

Bolts	M14		175 Nm
-------	-----	--	--------

- Tighten nuts (1).

Exhaust system to transmission

Bolts	M8		19 Nm
-------	----	--	-------



Additional Information

Overview of Tightening Torques

V-band clamp, exhaust system, to catalytic converter

Used in step 3

V-band clamp			25 Nm
--------------	--	--	-------

Exhaust system to body

Used in step 3

Nut	M8		21,4 Nm
-----	----	--	---------

Reinforcement plate to body

Used in step 3

Nut	M8		19 Nm
-----	----	--	-------

Longitudinal struts to rear axle support/body

Used in step 3

Bolts	M10		65 Nm
-------	-----	--	-------

Exhaust system to stiffening plate

Used in step 3

Bolts	M8		19 Nm
-------	----	--	-------

Reinforcement braces

Used in step 3

Bolts	M14		175 Nm
-------	-----	--	--------

Exhaust system to transmission

Used in step 3

Bolts	M8		19 Nm
-------	----	--	-------

Overview of Special Tools



0 496 959 (33 0 080) Key

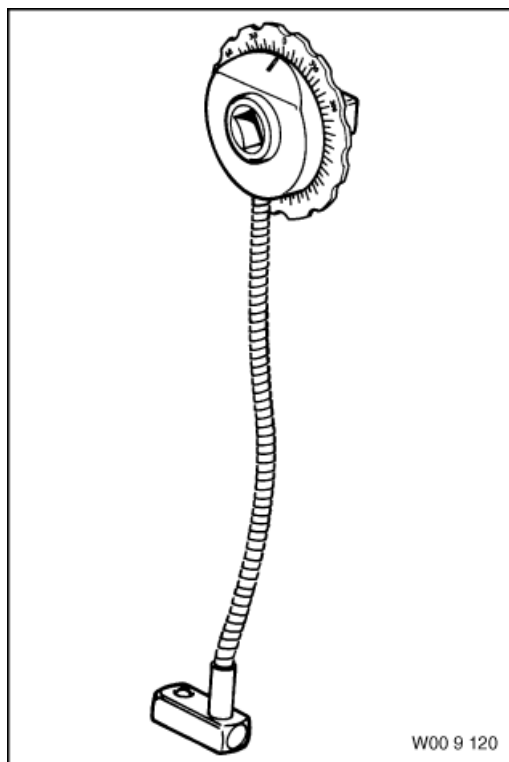


Common

Used in step 2

Usage	For loosening and tightening the propeller shaft to rear axle final drive screw connection (slot nut). SW50. Replaces SWZ 33 5 040 (0495551) as well from 09/2014.
Included in the tool or work	
Storage location	A17
Replaced by	
In connection with	33 5 070 = 0495554
SI-Number	01 11 10 (641)

0 490 504 (00 9 120) Torque angle measuring dial



Common

Used in step 2

Usage	For torsion angle adjustment of cylinder head bolts (all engines) And reinforcement plate front axle support E46
Included in the tool or work	
Storage location	A4
Replaced by	
In connection with	
SI-Number	

0 495 108 (00 9 130) Magnet



Common

Used in step 2

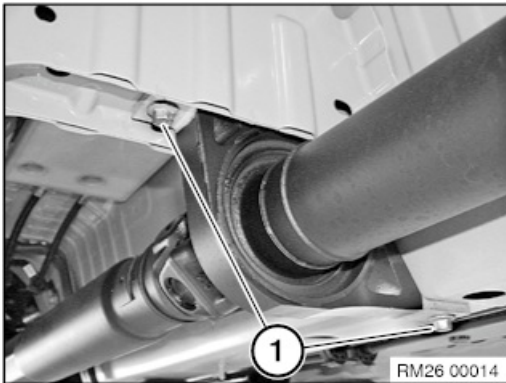
Usage	(Magnet with 1/2 " connection) For securing torque angle dial 00 9 120 to body.
Included in the tool or work	
Storage location	B52
Replaced by	
In connection with	
SI-Number	01 17 04 (130)





Necessary preliminary tasks:

- Remove exhaust system.
- Remove heat shields.

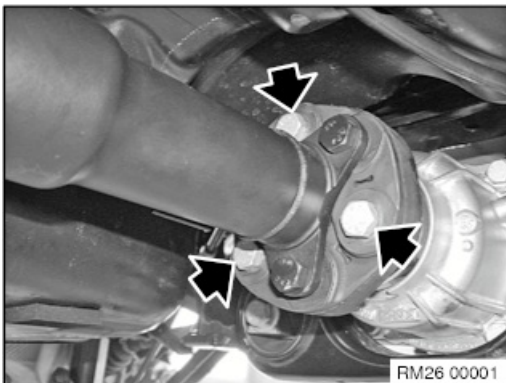


Release screws (1).

Tightening torque 26 11 4AZ.

Note:

To protect the universal joint, tie back propeller shaft in area of centre mount.



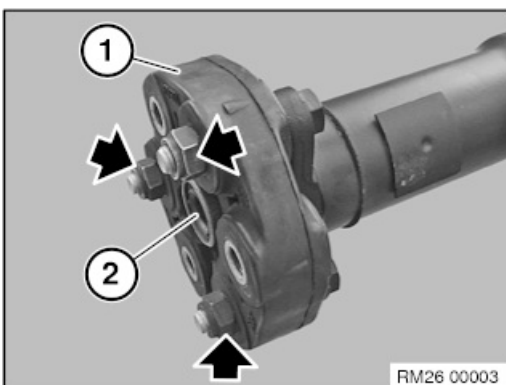
Release screws.

Tightening torque 26 11 2AZ.

Replace screws.

Installation note:

Replace ZNS bolts and self-locking nuts.



Release screws and remove flexible disc (1) from propeller shaft.

Tightening torque 26 11 3AZ.

Installation note:

Check centring (2).

Replace damaged centring mount.

Grease centring mount.

During installation the arrows on the circumference of the flexible disc must point to the flange arms.

Important!

Replace ZNS bolts and self-locking nuts.

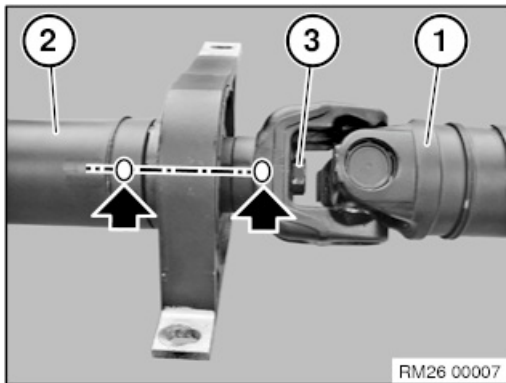


**Special tools required:**

- 00 7 500
- 23 2 430

**Necessary preliminary work:**

- Remove propeller shaft.

**Note:**

The propeller shaft is balanced.

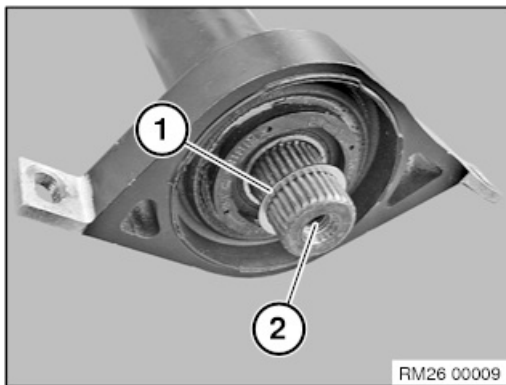
The front and rear propeller shafts must be reassembled in the same position.

Mark front propeller shaft (1) and rear propeller shaft (2) in one plane.

Undo bolt (3) and pull apart propeller shaft.

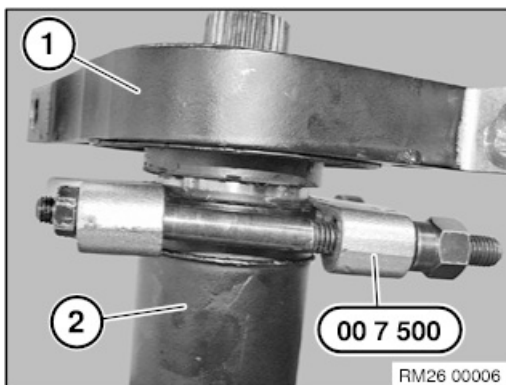
Replace screw.

Tightening torque 26 11 5AZ.

**Installation note:**

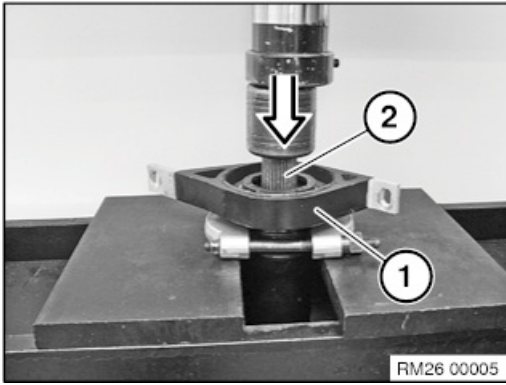
Pay attention to installed position of spacer ring (1).

Clean thread (2).

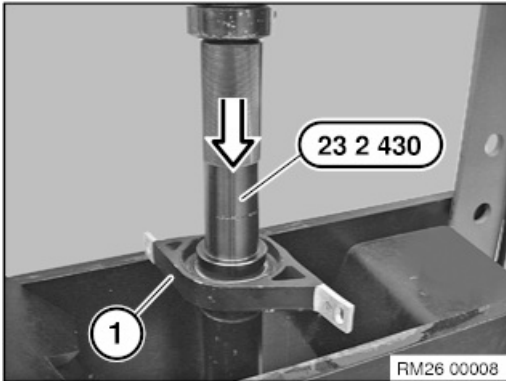


Install special tool 00 7 500 between centre bearing (1) and propeller shaft (2).





Using a hydraulic press, force centre mount (1) off propeller shaft (2). *Installation note:*
Apply a coating of grease to longitudinal splines on shaft.
Grease, refer to BMW Service Operating Fluids.



Use special tool 23 2 430 to press on new centre bearing (1).

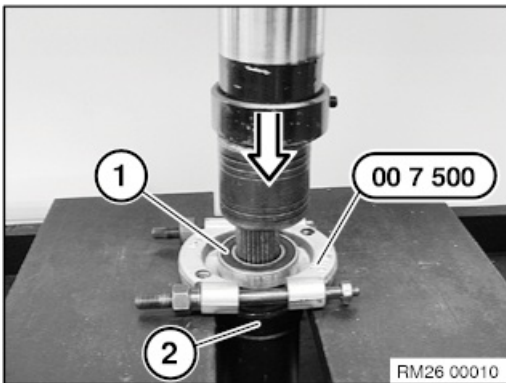


**Special tools required:**

- 00 7 500
- 23 2 430

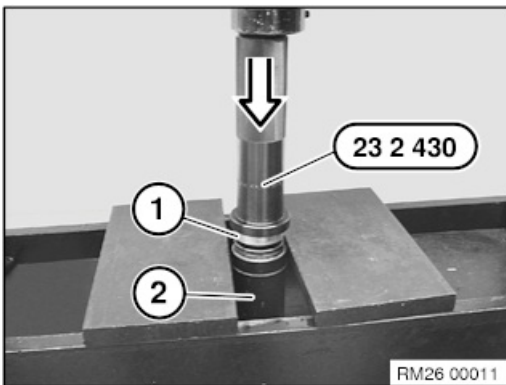
**Necessary preliminary work:**

- Replace propeller shaft centre bearing



Install special tool 00 7 500 between deep groove ball bearing (1) and propeller shaft (2).

Using a hydraulic press, force deep groove ball bearing (1) off propeller shaft (2).



Use special tool 23 2 430 to press new deep groove ball bearing (1) on to propeller shaft (2).



27 00 ... Top up oil in transfer box (PTO)



Important!

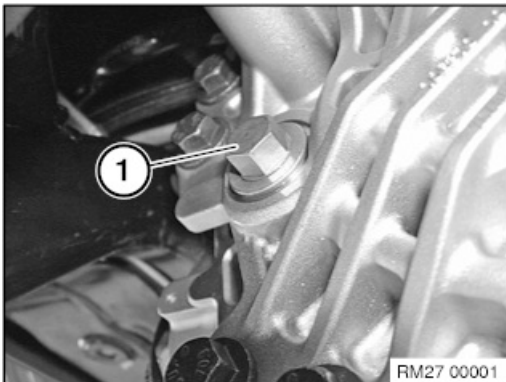
Use only the approved transmission oil in the transfer box.

Failure to comply with this requirement will result in serious damage to the transfer box!



Necessary preliminary work:

- Remove underbody protection



Check transfer box oil level, correct:

Undo oil filler plug (1).

Check transfer box oil level.

If necessary, pour in transmission oil up to lower edge of opening for oil filler plug (1).

Installation note:

Tightening torque 27 10 3AZ.



**Recycling:**

Catch and dispose of escaping transmission oil. Observe country-specific waste disposal regulations

**Important!**

The spare part transfer box is delivered **without** oil filling.

After installation an oil top up **must be carried out** and the transmission oil level checked.

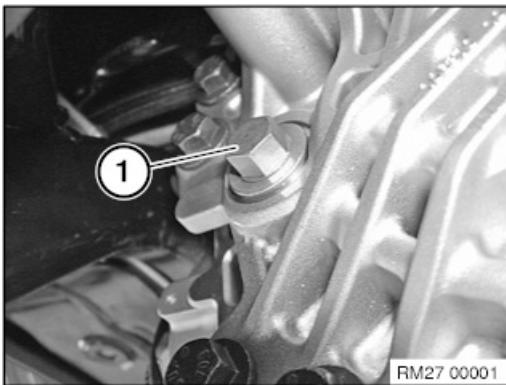
**Necessary preliminary tasks:**

- Remove transfer box



Modify following parts:

- Convert the connecting shaft
- Convert covers and protective caps
- Convert drive shaft transportation retainer

**Important!**

After completing work top up transmission oil.

Release filler plug (1).

Check oil level.

Tightening torque 27 10 3AZ

Pour in transmission oil up to lower edge of opening for filler plug (1).

Use only the approved transmission oil.

Failure to comply with this requirement will result in serious damage to the transfer box!



**Important!**

After completion of repair work, check transmission oil level and top up if necessary.

Failure to comply with this requirement will result in serious damage to the transfer box!

**Important!**

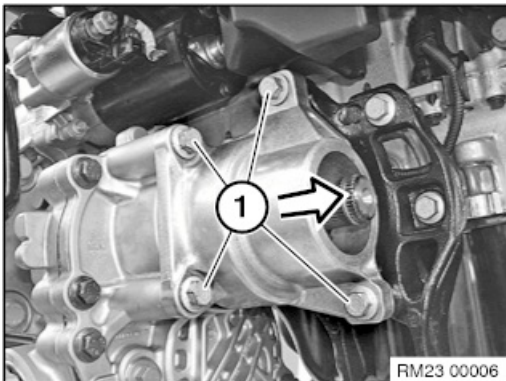
When removing and installing, on **no account** must the transfer box (PTO) filled with oil be tilted more than 45°, irrespective of which direction.

**Necessary preliminary tasks:**

- Manual gearbox only: Drain and catch transmission oil.
- Remove right output shaft only at transmission end and hang up.
- Remove exhaust system
- Partially remove propeller shaft.
 - Disconnect propeller shaft at transfer box flange.
 - Release centre mount.
 - Tie up the propeller shaft to the vehicle underbody.

Note:

Bending the propeller shaft by an excessive angle can cause premature damage to the joint/propeller shaft!

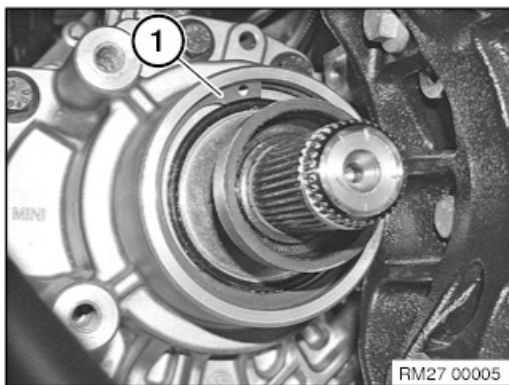


Release screws (1).

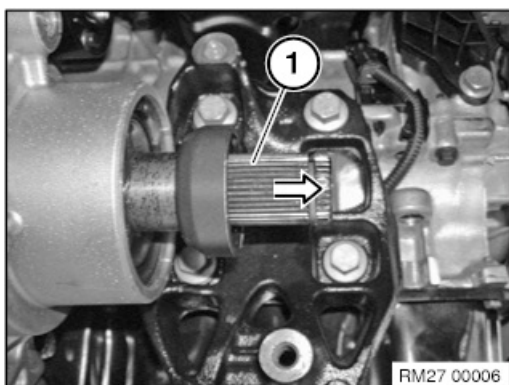
Remove PTO mount.

Tightening torque 27 10 2AZ

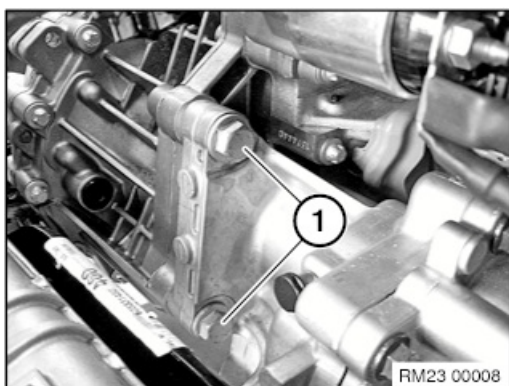




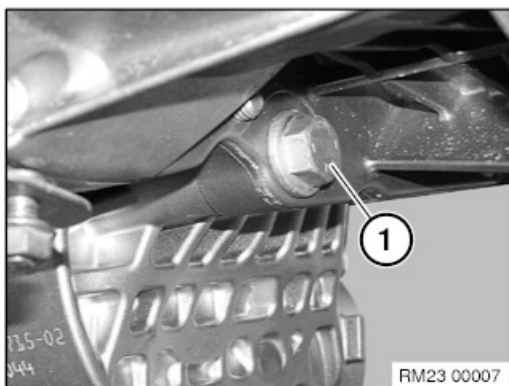
Remove circlip (1). *Installation note:*
Install retaining ring (1).



Pull the connecting shaft (1) out of the PTO housing. *Note:*
If the connecting shaft cannot be pulled out of the housing, see
separate instructions for removing connecting shaft from PTO housing.

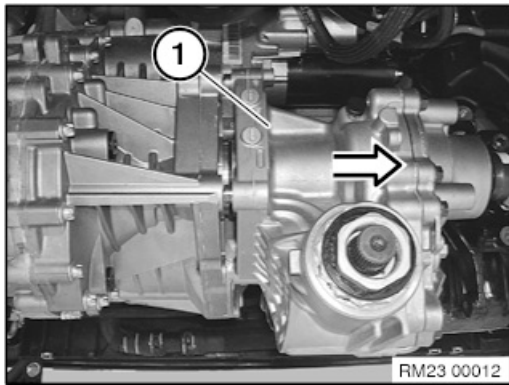


Release PTO bolts (1).
Tightening torque 27 10 1AZ

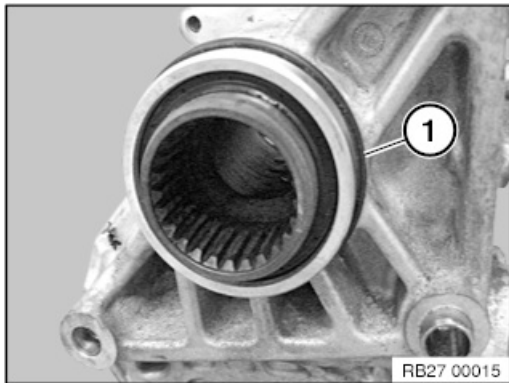


Undo PTO bolt (1).
Tightening torque 27 10 1AZ





Slightly pull PTO (1) in the direction of the arrow and remove. **Important!**
When removing and installing, on **no account** must the transfer box (PTO) filled with oil be tilted more than 45°, irrespective of which direction.



Installation note:
Before installing the transfer box:
Check the sealing ring (1) for damage and lubricate lightly.
If necessary, replace sealing ring.





Special tools required:

- 27 2 070
- 27 2 030



Important!

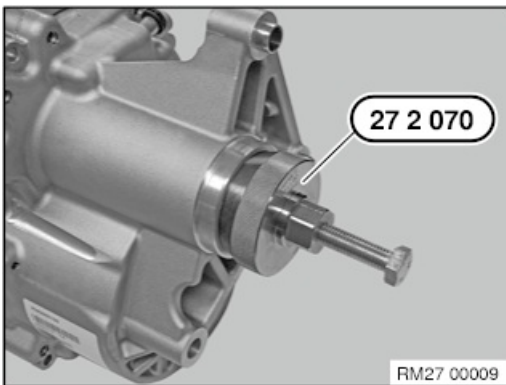
After completion of work, check transmission oil level and top up if necessary.

Failure to comply with this requirement will result in serious damage to the transfer box!



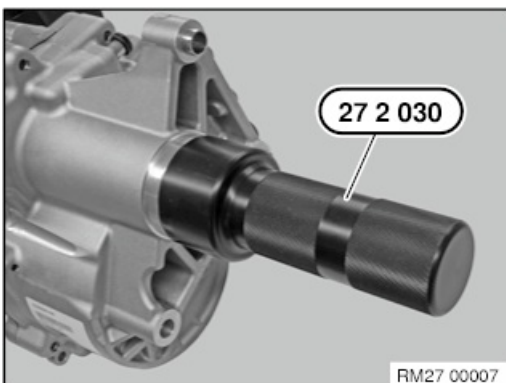
Necessary preliminary tasks:

- Manual gearbox only: Drain and catch transmission oil.
- Remove transfer box (PTO)



Screw in special tool 27 2 070 until it is firmly connected with radial shaft seal.

Screw in bolt until the radial shaft seal is released from the housing.



Wet the sealing lip of the new radial shaft seal with oil.

Drive shaft seal firmly home with special tool 27 2 030 .



**Special tools required:**

- 27 2 060
- 27 2 020

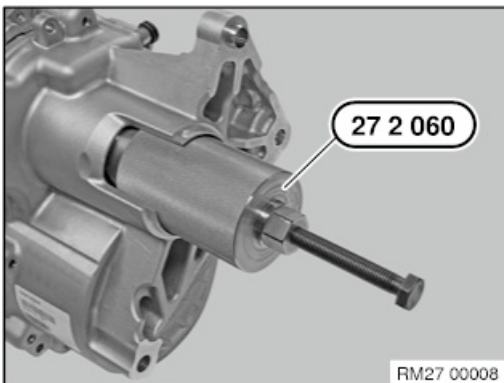
**Important!**

After completion of work, check transmission oil level and top up if necessary.

Failure to comply with this requirement will result in serious damage to the transfer box!

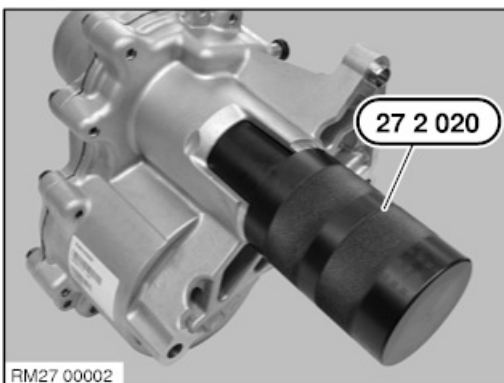
**Necessary preliminary tasks:**

- Manual gearbox only: Drain and catch transmission oil.
- Remove transfer box (PTO)



Screw in special tool 27 2 060 until it is firmly connected with radial shaft seal.

Screw in bolt until the radial shaft seal is released from the housing.



Wet the sealing lip of the new radial shaft seal with oil.

Drive shaft seal firmly home with special tool 27 2 020 .



**Special tools required:**

- 27 2 080
- 27 2 040

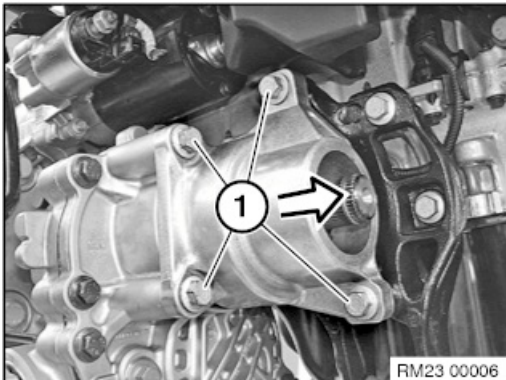
**Important!**

After completion of work, check transmission oil level and top up if necessary.

Failure to comply with this requirement will result in serious damage to the transfer box!

**Necessary preliminary tasks:**

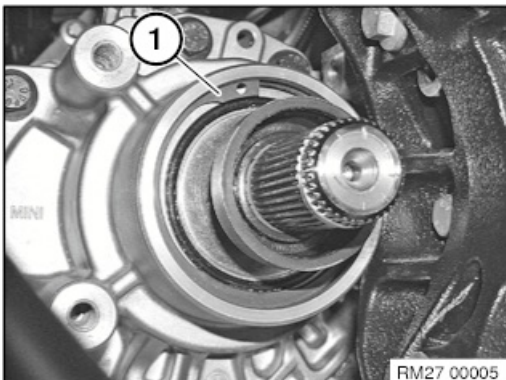
- Manual gearbox only: Drain and catch transmission oil.
- Remove right output shaft



Release screws (1).

Remove PTO mount.

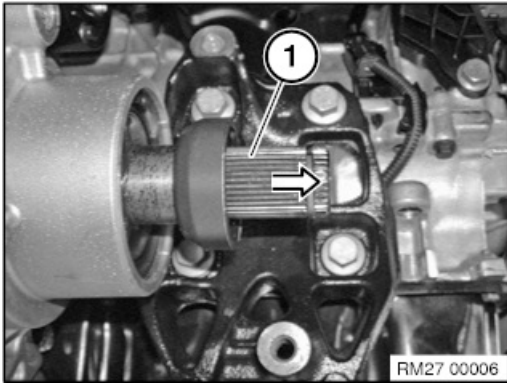
Tightening torque 27 10 2AZ.



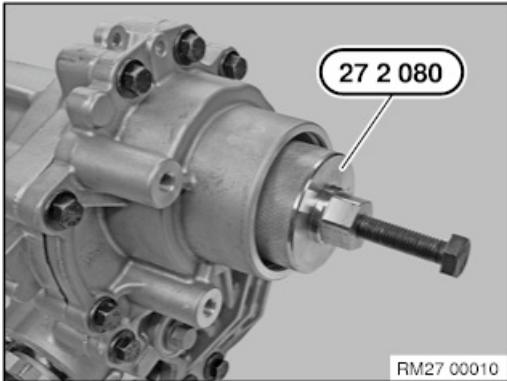
Remove circlip (1). *Installation note:*

Install retaining ring (1).



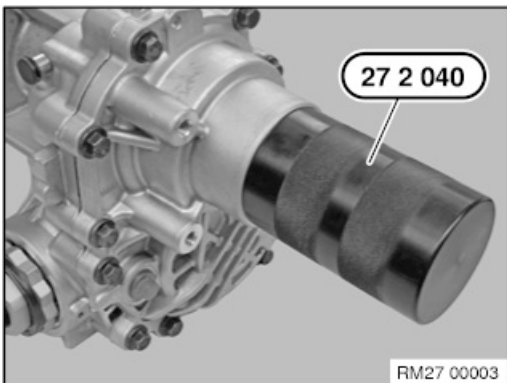


Pull the connecting shaft (1) out of the PTO housing.



Screw in special tool 27 2 080 until it is firmly connected with radial shaft seal.

Screw in bolt until the radial shaft seal is released from the housing.



Wet the sealing lip of the new radial shaft seal with oil.

Drive shaft seal firmly home with special tool 27 2 040 .



27 00 ... Top up oil in transfer box (PTO)



Important!

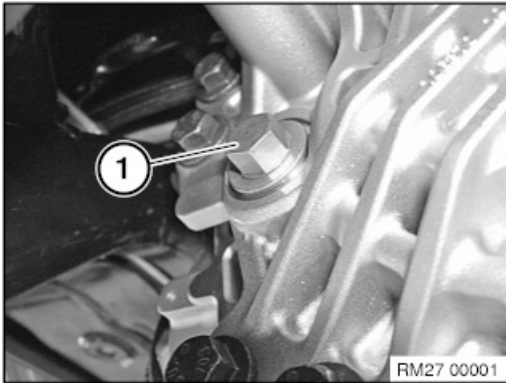
Use only the approved transmission oil in the transfer box.

Failure to comply with this requirement will result in serious damage to the transfer box!



Necessary preliminary work:

- Remove underbody protection



Check transfer box oil level, correct:

Undo oil filler plug (1).

Check transfer box oil level.

If necessary, pour in transmission oil up to lower edge of opening for oil filler plug (1).

Installation note:

Tightening torque 27 10 3AZ.



00 Danger of injury if oil comes into contact with eyes and skin



Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin



Protective measures/rules of conduct:

- Wear safety goggles.
- Wear oil-resistant protective gloves.
- Observe country-specific safety regulations.



First aid measures:

- Eye contact: Immediately rinse out eyes with lots of water and for at least 15 minutes. In the case that it is available, use an eye wash bottle. If eye irritation persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

Note: Do not use solvents/thinners.



**Danger of poisoning!**

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

**Protective measures/rules of conduct:**

- Fill oil in appropriately marked containers only.
- Do not pour oil in drinking vessels (beverage bottles, glasses or cups).
- Observe country-specific safety regulations.

**First aid measures:**

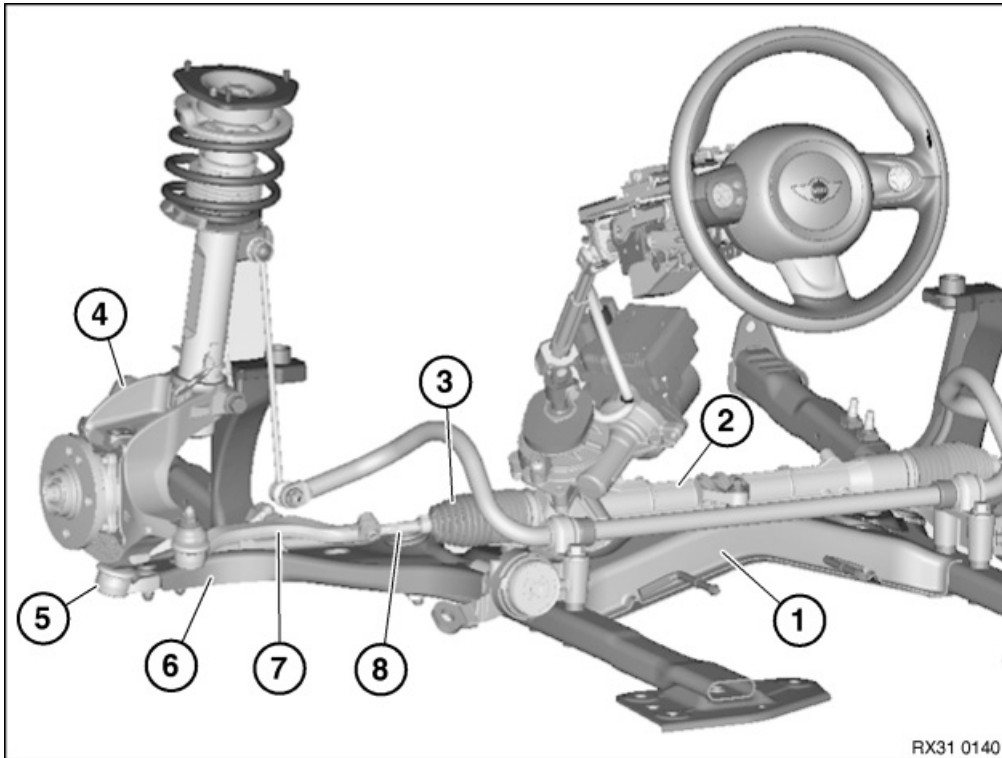
- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.



31 00 ... Front axle + steering: wheel alignment check must be carried out after the following work



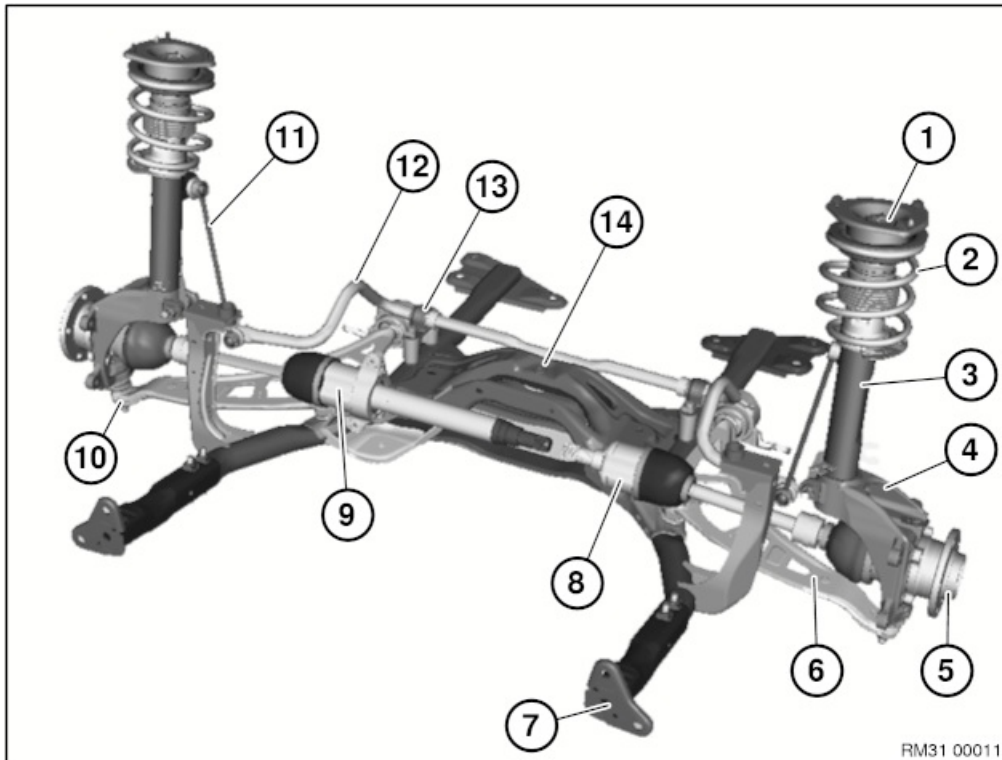
A wheel alignment check must be carried out after the following work:

- Release of following screw connections:
 - Steering box to front axle support
 - Wheel control joint to swivel bearing
 - Track rod end to track rod
 - Support bearing on body (when centering is not available)

- Replacement of following parts:
 1. Front axle support
 2. Steering box
 3. Gaiter (if the tie rod end has to be screwed off)
 4. Swivel bearing
 5. Wheel guide joint
 6. Wishbone
 7. Track rod end
 8. Track rod



31 Front axle overview



Safety instructions & general information

- 1 Spring strut support bearing
- 2 Coil spring
- 3 Spring strut shock absorber .
- 4 Swivel bearing
- 5 Wheel bearing
- 6 Wishbone / bracket / rubber mount
- 7 Bumper bracket
- 8 Left output shaft
- 9 Right output shaft
- 10 Wheel guide joint
- 11 Anti-roll bar link
- 12 Anti-roll bar
- 13 Stabilizer rubber mount
- 14 Front axle support

Adjusting procedure

Testing

Troubleshooting



31 00 ... Information on replacing shock absorbers

Situation:

When a shock absorber is faulty on one side (leaking, noises, limit values exceeded on the shock tester), often both shock absorbers on the axle in question are replaced.

Effect:

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as defective parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure:

If one shock absorber is damaged, it is only necessary to replace both shock absorbers when the car has driven in excess of 80 000 km.



31 00 ... Instructions (chassis components made of aluminium)

Due to the chemical and corrosion characteristics of aluminium, always comply with the following points when handling aluminium components:

- Do not bring into contact with battery acid!
- Do not clean with wire brushes made of brass or iron! Always use wire brushes with stainless steel bristles!
- Do not expose to flying sparks when grinding/separating! Cover components!
- Do not strike with steel welding splashes! Cover components!
- Do not expose to temperatures $> 80\text{ }^{\circ}\text{C}$, even for brief periods! Temperatures in paint facilities do not have the same impact



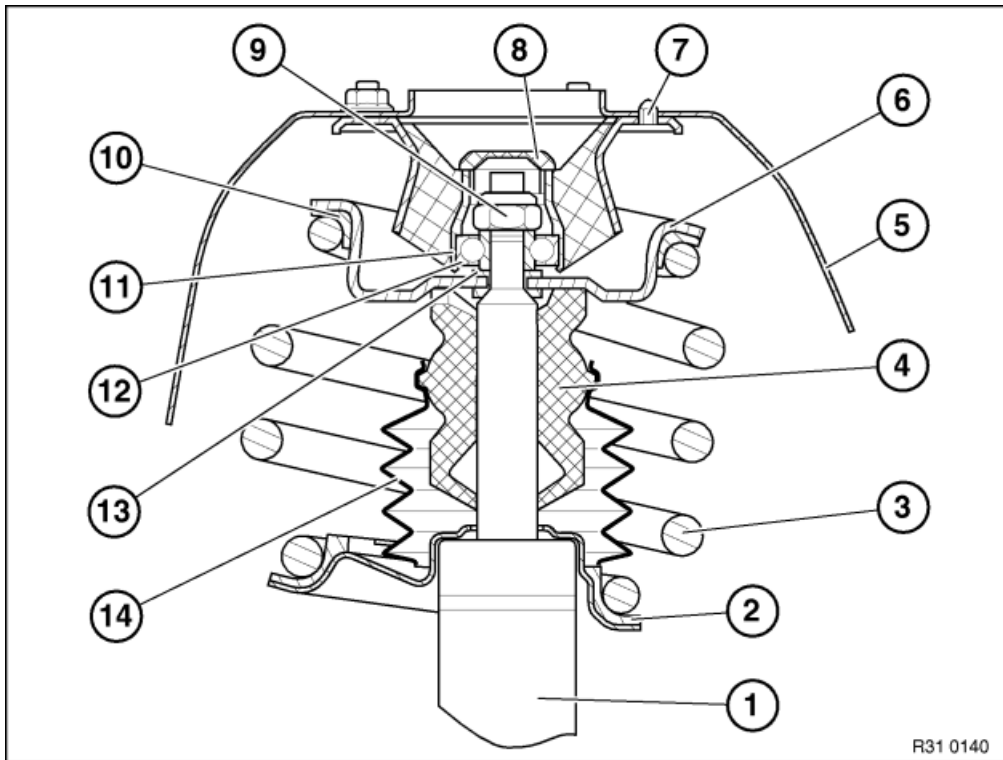
31 00 ... Instructions (chassis components made of aluminium)

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- Do not expose to flying sparks when grinding/separating! Cover components!
- Do not strike with steel welding splashes! Cover components!
- Do not expose to temperatures $> 80\text{ }^{\circ}\text{C}$, even for brief periods! Temperatures in paint facilities do not have the same impact



31 Layout of spring strut shock absorber



- | | |
|-------------------------------|-----------------------|
| 1 Spring strut shock absorber | 10 Upper spring pad |
| 2 Lower spring pad | 11 Support bearing |
| 3 Coil spring | 12 Dust sleeve |
| 4 Auxiliary damper | 13 Thrust washer/shim |
| 5 Wheel arch | 14 Gaiter |
| 6 Upper spring plate | |
| 7 Centering pin | |
| 8 Cover cap | |
| 9 Nut | |





Warning!
Danger of injury!

Before beginning work, position table lift with the lower frame securely on the floor.

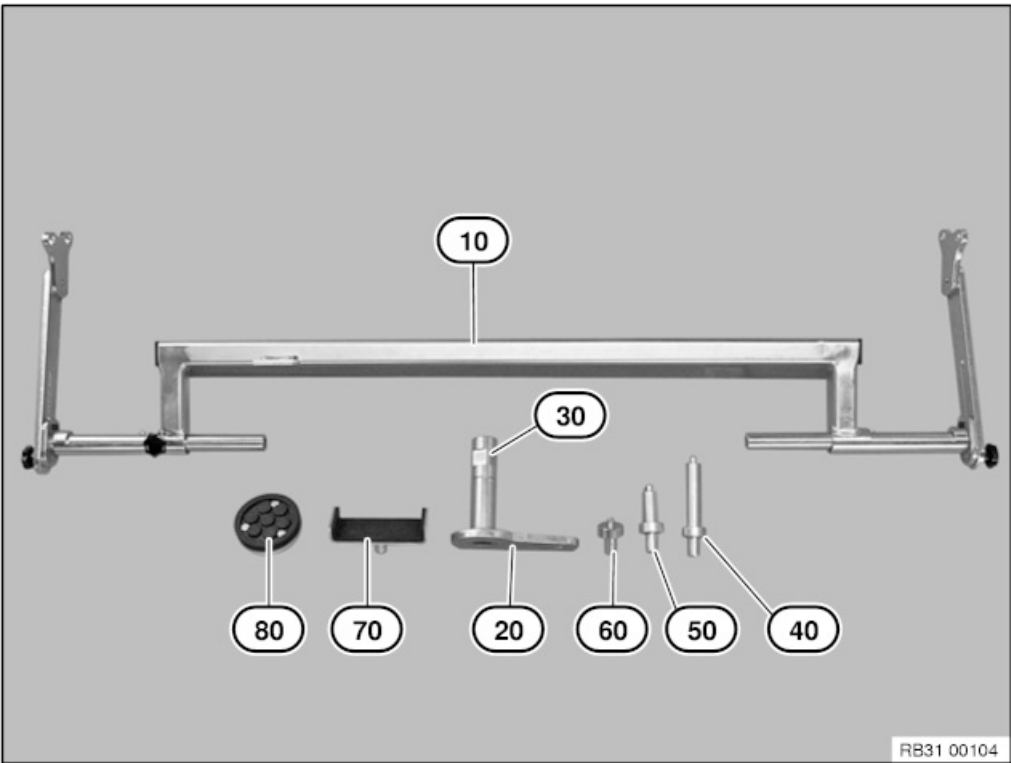
Danger area around mechanism below platform.

- Do not reach into or step into the danger area.
- Note permissible bearing capacity of table lift.
- Mount load centrally (danger of tipping) and secure against shifting.

Follow the operating instructions from the equipment manufacturer.



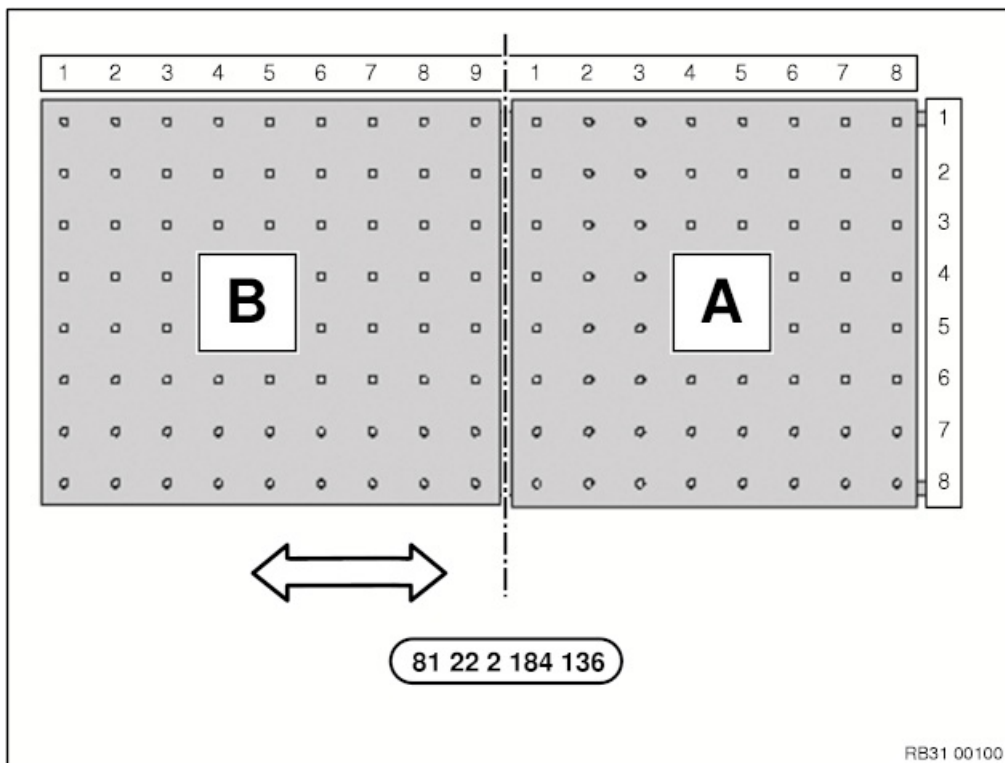
The mobile table lift is used for collision repairs and when removing large engines.



Adaptations for mounting front axle with engine and transmission.

No. 10	For mounting swivel bearing with brake disc
No. 20	Retaining element for adjustable fixture
No. 30	Adjustable fixture
No. 40	Distance pin 40 x 160 mm
No. 50	Distance pin 40 x 110 mm
No. 60	Distance pin 40 x 60 mm
No. 70	Fixture with U-profile
No. 80	Plate fixture Ø=100 mm





Release star knob screw on working plate (B) of table lift; the working surface (B) can be extended by approx. 310 mm.

Release all push-pull clamps and the working plates can be shifted by approx. 20 mm.

Working plate (A and B) can be raised and lowered by 3° on the long side and by 5° on the transverse side.

Working plate (A and B) is subdivided by a coordinate system and a possible installation position is recommended in the respective repair manual.



Important!

Follow the operating instructions from the equipment manufacturer.



31 00 ... Notes on repairing threads

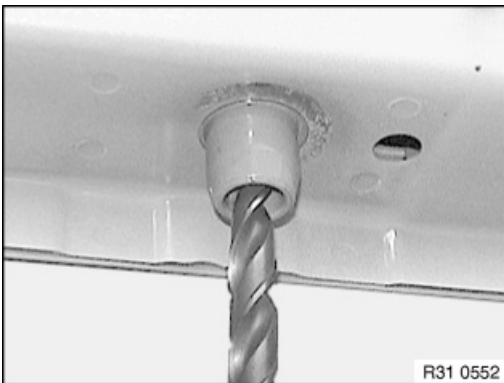


Important!

Install Helicoil thread inserts so that they are flush with the original thread.

Note:

Damaged threads in engine support may be repaired with Helicoil thread inserts. Comply with the procedure described in the example.



Procedure:

1. Create a clean core hole; if necessary, drill out screw remnants

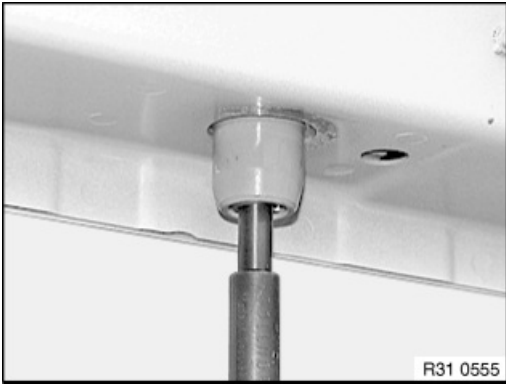


2. Create locating thread for Helicoil thread insert



3. Pick out Helicoil thread insert in accordance with the table and screw into the locating thread until flush with the original thread





4. Break drive pin and remove



31 00 ... Notes on wheel bearing replacement following accident damage

Wheel bearing facts:

In the event of accidents or driving conditions similar to accidents, shock-like loads to the wheel bearing units can cause slight damage to the bearing track. Despite initial running without noise, with continued use, this results in later noise generation at the wheel bearing.

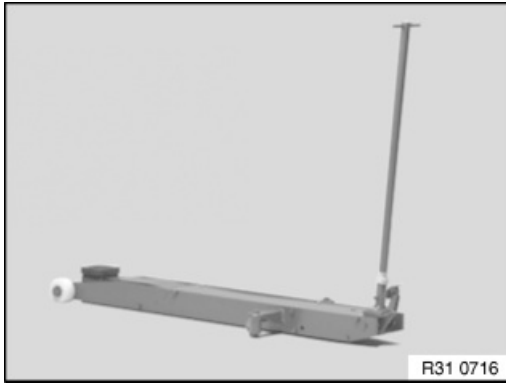
Procedure:

The wheel bearing must be replaced on the damaged side of the axle if one or several of the following points apply:

- Visible or noticeable damage to the wheel bearing
- Rolling noises, radial/lateral runout on the wheel bearing
- Permissible tolerance for the wheel alignment is exceeded and no longer adjustable without the exchange of additional components
- Damage, permanent deformation or fractures to:
 - Wheel rims (major damage) and simultaneous negative result for wheel alignment
 - Spring struts, swivel bearings, wheel carriers
 - Wishbones
 - Struts or trailing links or anti-roll bar with this function
 - Body-side screwing/attachment points for wheel guide/control components
 - Track rods
 - Steering box fixtures

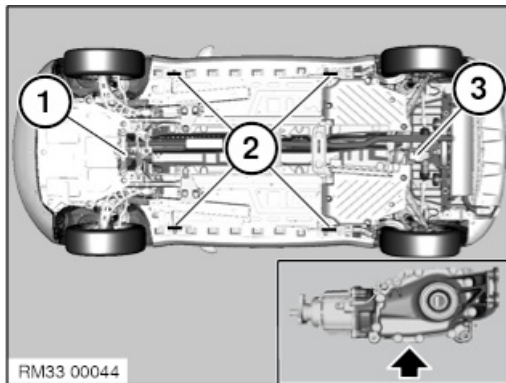
This guideline is binding for all accident repairs to BMW, MINI and Rolls-Royce vehicles!



**Caution!**

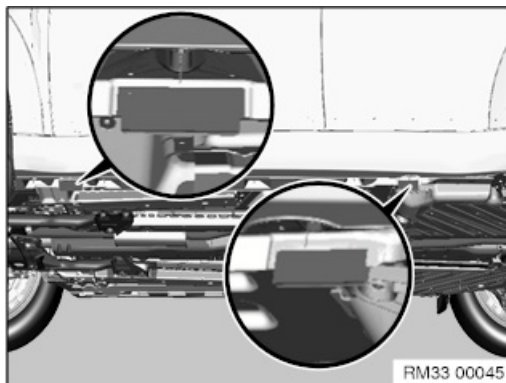
Observe the following trolley-jack-related notes:

1. Only BMW-distributed/approved trolley jacks which have a rubber plate on their mounting are to be used.
2. Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!
3. Check the rubber plate on the trolley jack prior to each use, replacing if necessary.

**Warning!**

The vehicle may be raised with a trolley jack only at the following mounting point!

- 1 Front strut at front axle support
- 2 Side car jacking points
- 3 Rear axle differential (only all-wheel drive vehicle)

**Risk of damage!**

Align the rubber plate on the trolley jack to the jacking points in such a way so there is no contact to adjacent components and they are therefore not damaged.



00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



Warning!

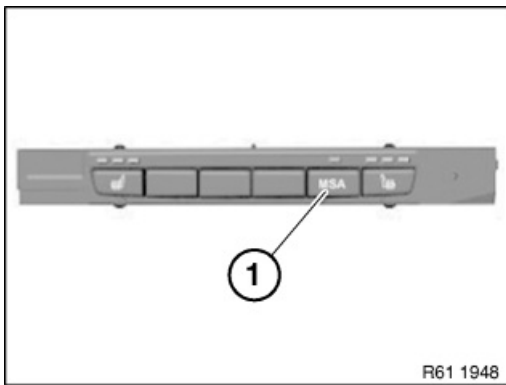
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

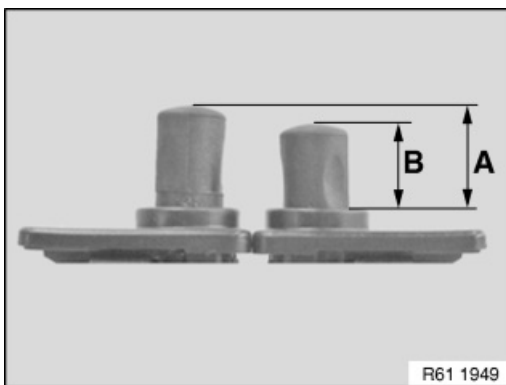
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode
 $A = 10 \text{ mm}$
 - Basic setting (engine hood/bonnet open)
 $B = 7 \text{ mm}$

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



When working with diagnosis tools:

- Observe instructions in diagnosis tool





Note:

For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) Service Information (bulletin) 61 01 07 335
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) Service Information (bulletin) 61 01 10 629



**Warning!**

Danger of poisoning if oil is ingested/absorbed through the skin!

Risk of injury if oil comes into contact with eyes and skin!

**Recycling:**

Observe country-specific waste disposal regulations.

**Measures if oil is unintentionally released:**

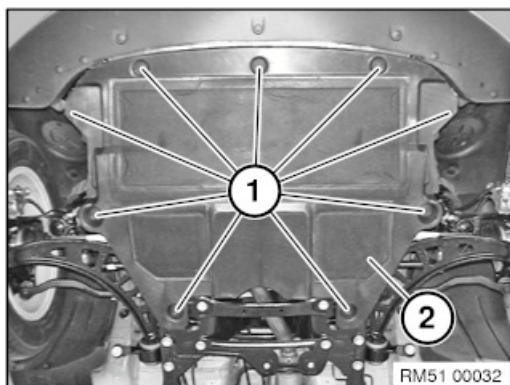
- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

Note: Do not flush oil away with water or aqueous cleaning agents.



51 47 490
(petrol)

Removing and installing / replacing front underbody protection



Release screws (1).

Remove underbody protection (2).

Installation note:

Centre underbody protection and tighten down screws.

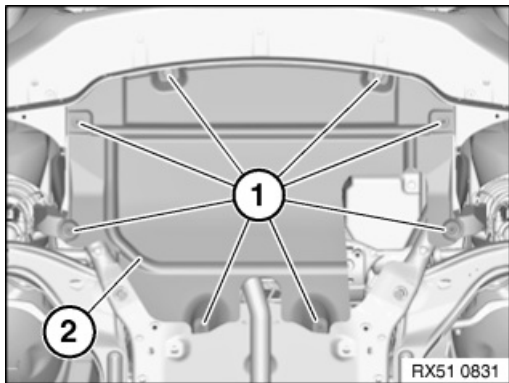


51 47 490 Removing and installing/replacing front assembly underbody protection (diesel)



Note:

Picture created using the R56 COOPER D as the example. There may be differences in detail in the case of other models.



Release screws (1).

Pull forward underbody protection (2) under bumper trim and remove.

Installation note:

Centre underbody protection and tighten down screws.



**Special tools required:**

- 31 5 251
- 00 2 030
- 31 5 255
- 31 5 253

**Warning!**

Danger of injury!

Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.

When supporting components, make sure that:

- the vehicle can no longer be raised or lowered.
- the vehicle does not lift off the locating plates on the vehicle hoist.

**Attention!**

Before lowering/removing front axle support:

Observe safety information for raising the vehicle

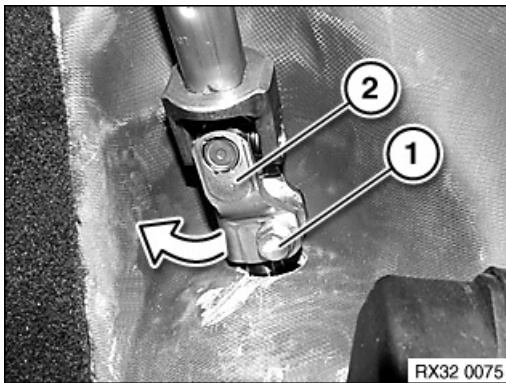
In order to avoid damage to vehicle hoist, perform weight compensation on vehicle.

Load spring strut domes with sand bags.

**Necessary preliminary tasks:**

- Remove front wheels.
- If necessary, remove underbody protection.
- Remove complete exhaust system. (except for N47 front-wheel drive)
- Partially remove front left and right wheel arch covers at bottom.
- All-wheel drive vehicle: Remove propeller shaft at transfer box.
- N47 All-wheel drive vehicle: Remove turbocharger pressure pipe.
- Only on right with ride height sensor: Release plug connection at sensor and move back cable.





Attention!

If the steering shaft is separated from the steering box, this can result in damage to the steering column switch cluster when the steering wheel is turned!

Release screw (1).

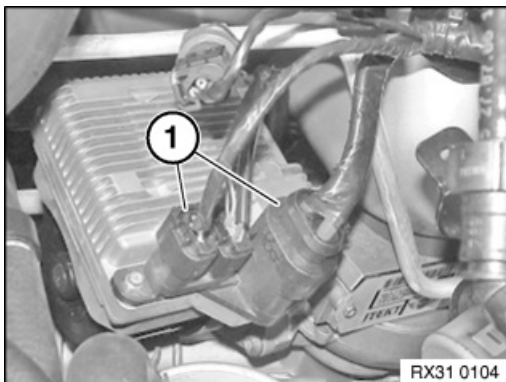
Tightening torque 32 31 2AZ

Detach lower section of steering shaft (2) from steering box and swing towards rear.

Installation note:

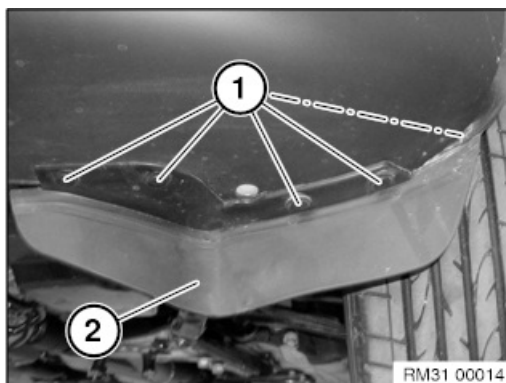
Clean thread to remove all remnants of screw locking adhesive.

Replace screw.



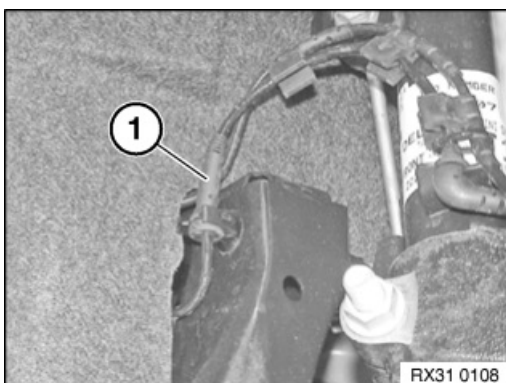
Disconnect plug connections (1) on steering box. **Attention!**

Make sure when lowering the front axle that the cables are not damaged!



Open the mounting clips (1) and remove the air guide (2) (right side is identical). *Installation note:*

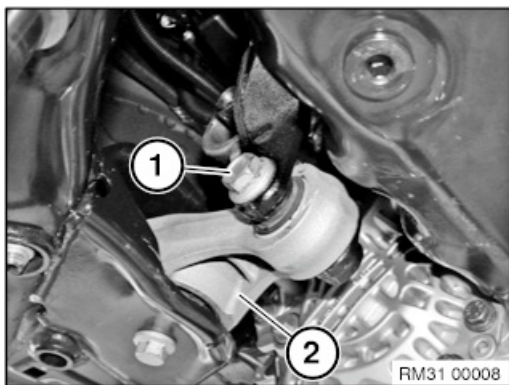
Replace the faulty mounting clips.



Disengage cable (1) of pulse sensor on left and right from holder on front axle support. **Attention!**

Make sure when lowering the front axle that the cable of the pulse sensor is not damaged!



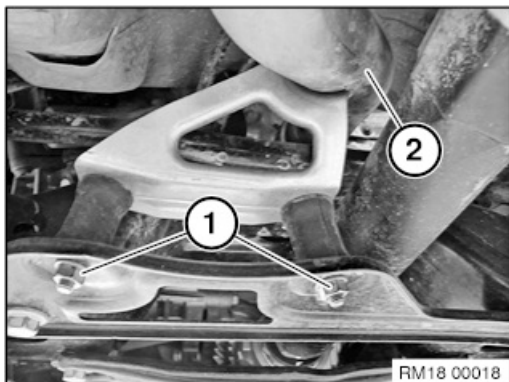


Undo bolt (1) at anti-roll bar link (2).

Tightening torque 22 11 6AZ.

Installation note:

First mount front axle support on engine support and then tighten screw (1).



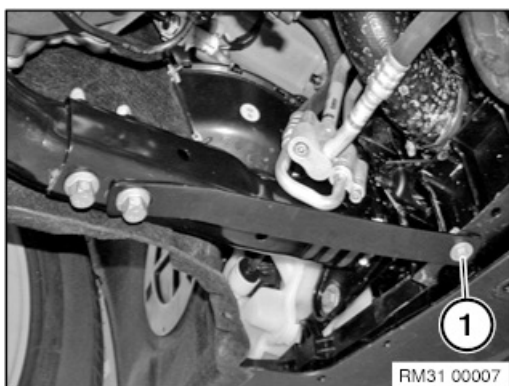
N47 only:

Release nuts (1) at front pipe (2).

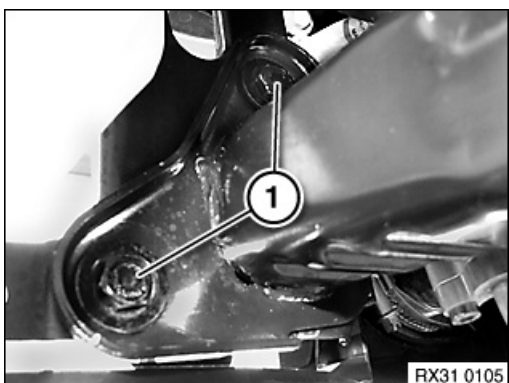
Tightening torque 18 20 7AZ.

Installation note:

Check rubber mount for damage, replace if necessary.



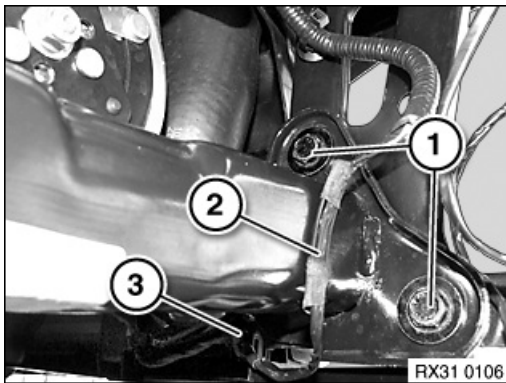
Undo bolt (1) at front panel strut.



Release screws (1) on bumper holder on left.

Tightening torque 51 11 4AZ.





Release screws (1) on bumper holder on right.

Tightening torque 51 11 4AZ.

Attention!

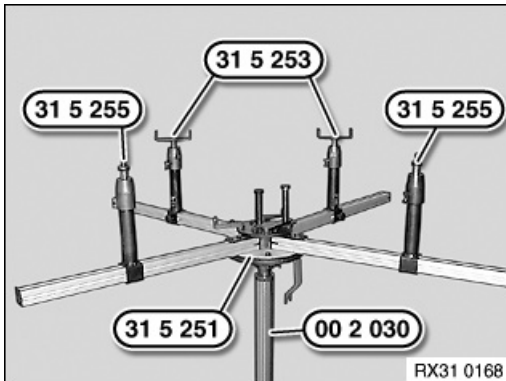
Make sure when lowering the front axle that the cable of the air conditioning compressor is not damaged.

Unclip cable tie (2).

Cut open cable strap (3).

Installation note:

Replace faulty cable straps and cable clips.



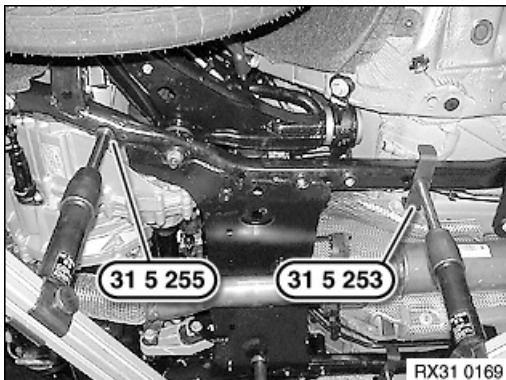
Fit the special tool 31 5 251 completely onto the universal jack 00 2 030 with a helper.

Insert special tools 31 5 255 in telescopic supports of a profile rail pair.

Note:

In a profile rail pair, two profile rails are connected to one another by gearing.

Insert special tools 31 5 253 in telescopic supports of a profile rail pair.

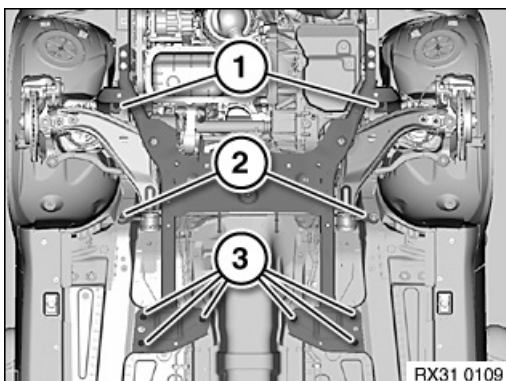


Note:

The jacking points on the left side are shown.

Align special tools 31 5 255 and 31 5 253 to front axle support.

Support front axle support by operating workshop jack 00 2 030 .



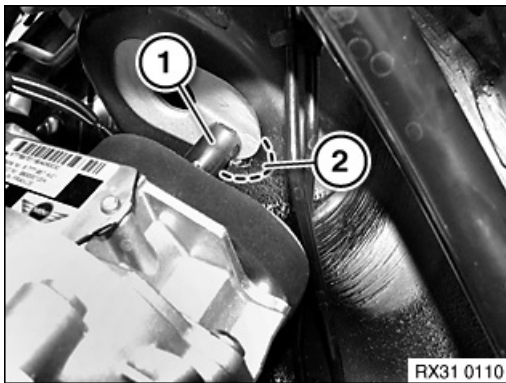
Unfasten screws (1) to (3). *Installation note:*

Check threads for damage; if necessary, repair with Helicoil thread inserts.

Make sure screws are installed in correct positions.

- Screws (1) M12
Tightening torque 31 11 1AZ.
- Replace screws (2) M10
Tightening torque 31 11 5AZ.
- Screws (3) M12
Tightening torque 31 11 2AZ.



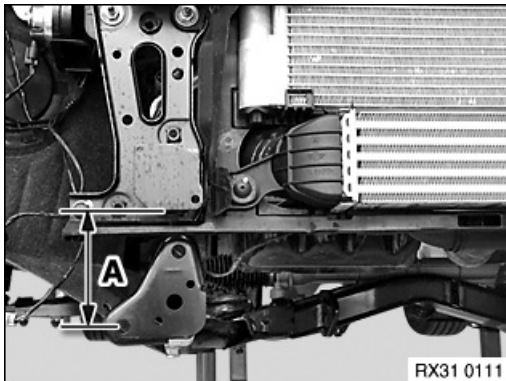


RX31 0110

Risk of damage!

When lowering the front axle support, it is absolutely essential to make sure that the torsion bar (1) of the electronic power steering (EPS) does not collide in area (2) with the bulkhead!

Collision with the bulkhead may result in damage to the electric steering box (EPS)!

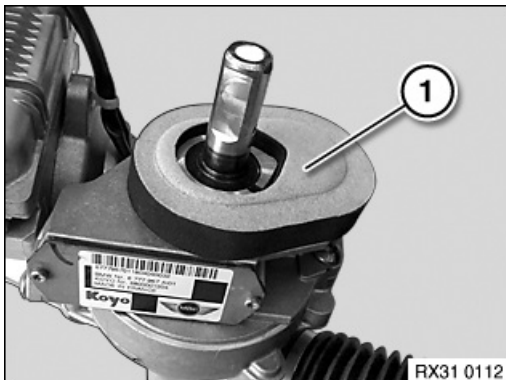


RX31 0111

Attention!

When lowering and raising, make sure there is freedom of movement between front axle support, transmission and refrigerant lines!

Lower front axle support max. to dimension (A) = 120 mm.



RX31 0112

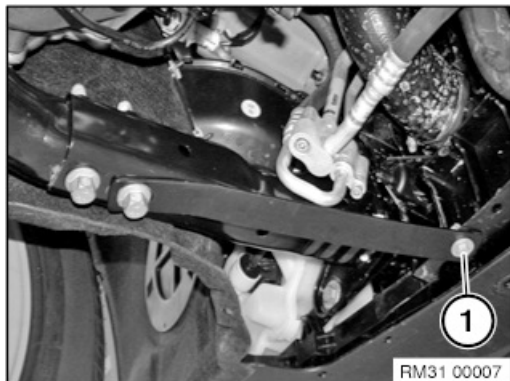
Attention!

Gasket (1) of electric steering box (EPS) must always be replaced!

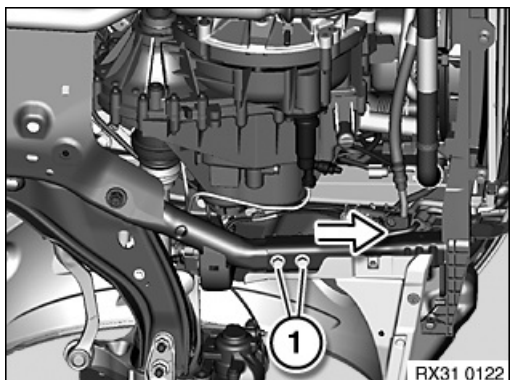


**Necessary preliminary work:**

- Remove carrier for bumper trim



Undo bolt (1) at front panel strut.



Release screws (1).

Pull off bumper bracket forwards from front axle support.

Installation note:

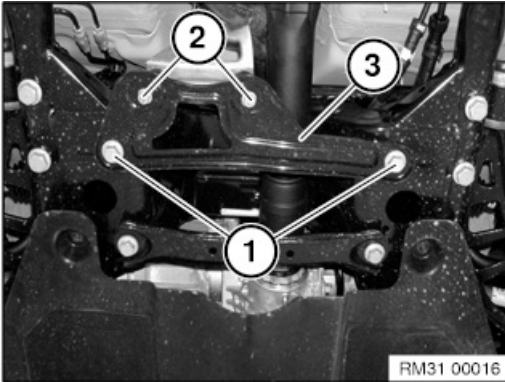
Tightening torque 31 11 3AZ



**Important!**

Observe safety informations for raising the vehicle

Driving without the reinforcement bar is not permitted!



Release screws (1).

Tightening torque 31 11 6AZ

Unscrew nuts (2).

Tightening torque 18 20 7AZ (diesel-engine car)

Tightening torque 18 31 8AZ (petrol-engine car)

Remove reinforcement bar (3).



31 11 007

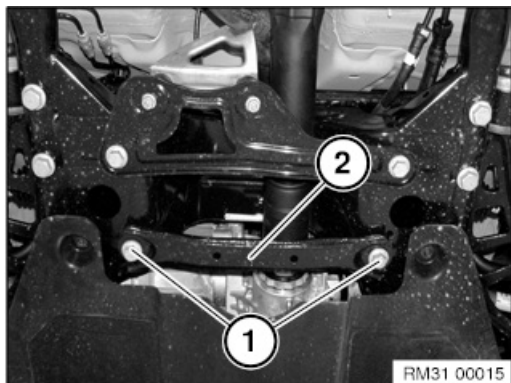
Removing and installing/replacing reinforcement strut



Important!

Observe safety informations for raising the vehicle

Driving without the reinforcement bar is not permitted!



Release screws (1).

Tightening torque 31 11 6AZ

Remove reinforcement bar (2).



31 11 001 Replacing front axle support



Note:

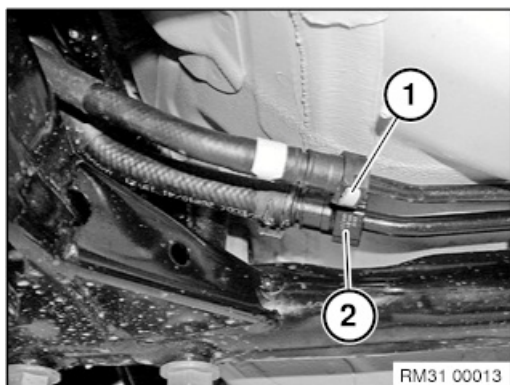
Replace self-tapping screws for mounting following components on front axle/engine support.

- Steering box
- Holder, wishbone / retaining bracket, anti-roll bar
- Bumper holder
- Holder, ride height sensor
- Front axle support (if replacing engine supports)



Necessary preliminary tasks:

- Lower front axle support.
- Remove both track rod ends from swivel bearing
- Remove both wishbones from swivel bearing.
- Remove both anti-roll bar links from anti-roll bar.



R60,R61 N47:

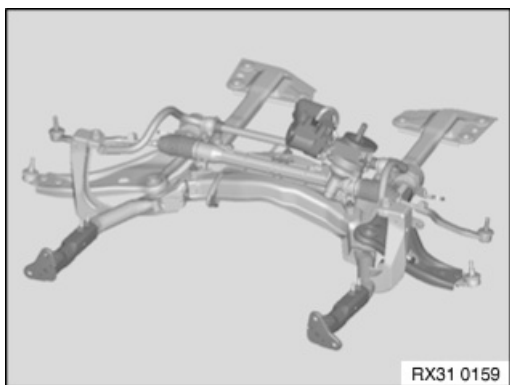
Unlock and detach fuel delivery and return line (1 and 2).

Thread out fuel lines between front axle support and anti-roll bar in the direction of the engine.

Recycling:

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.



Installation note:

Use previous front axle support as a template for modifying or replacing small parts.

Modify stabilizer.

If necessary, modify ride height sensor.

Modify both wishbones.

Modify steering box.

Modify both bumper holders.



After installation:

- Wheel alignment is only necessary after replacement and/or renewal of front axle support!



**Special tools required:**

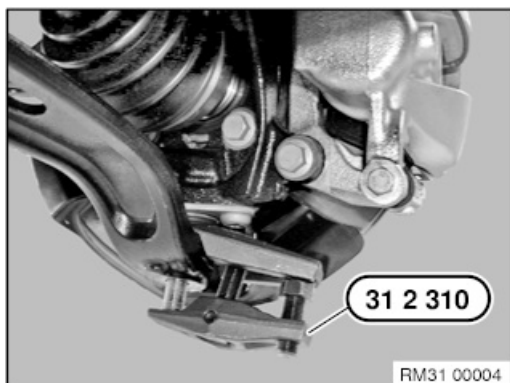
- 31 2 310
- 31 1 040

**Note:**

If the wishbone is replaced, the wheel alignment must be checked after assembly.

**Necessary preliminary work:**

- Remove front wheel
- Remove underbody protection
- Only on right with ride height sensor: Detach adjustment rod from wishbone



Undo nut at control joint.

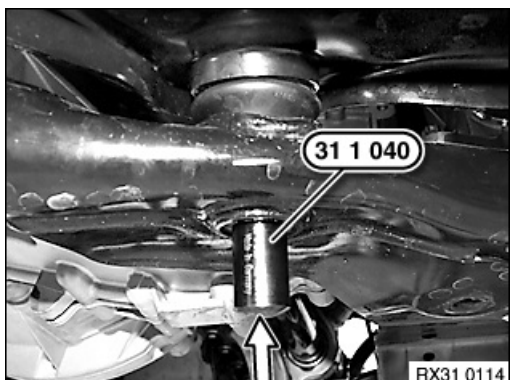
Tightening torque 31 12 1AZ.

Use special tool 31 2 310 to press wishbone from swivel bearing.

Installation note:

Keep wheel control joint to swivel bearing connection clean and free from oil and grease.

Renew nut.



Unfasten nut.

Tightening torque 31 12 3AZ.

Screw special tool 31 1 040 onto joint.

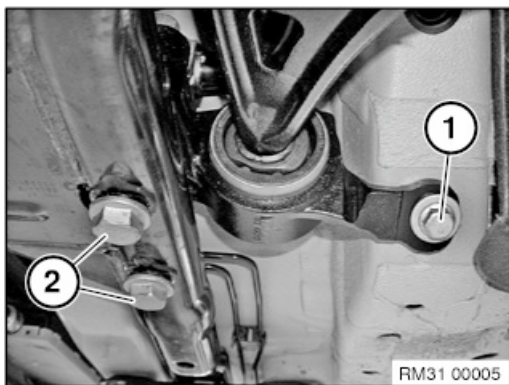
Strike joint from below to release it from taper in front axle carrier.

Installation note:

Keep wishbone to front axle support connection clean and free from oil and grease.

Renew nut.





Release screw (1).

Installation note:

Tightening torque 31 12 5AZ.

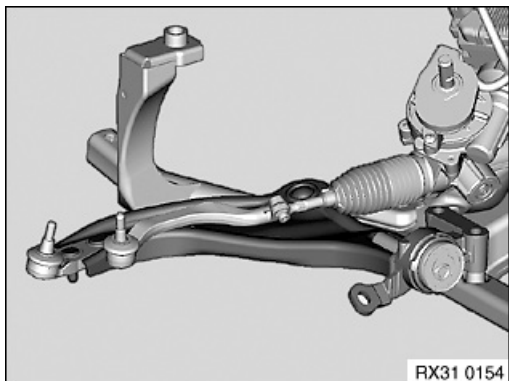
Renew screw.

Release screws (2) on left and right side of vehicle.

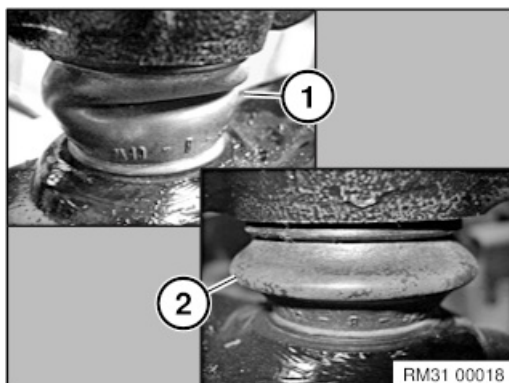
Installation note:

Tightening torque 31 12 4AZ.

Renew screws.



Remove wishbone with holder from front axle support.



Installation note:

The sealing bellows on the joint (wishbone - front axle support connection) must not curve into an unallowed direction during installation (partially inward) (1).

After installation, the sealing bellows must curve outward evenly and along its full area (2).

If the necessary curvature is not achieved, the screw connection of the wishbone must be opened again and the sealing bellows must be realigned or pushed into the necessary shape.

If necessary, the wishbone must be removed again and the sealing bellows must be preformed by pressing them down.



**Special tools required:**

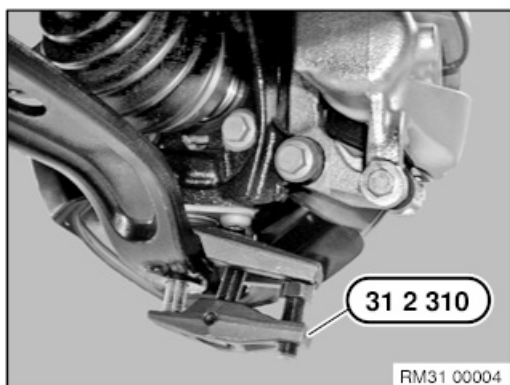
- 31 2 310
- 33 4 205
- 33 4 200

**Note:**

If the control joint is detached on the swivel bearing, the wheel alignment procedure must be carried out after assembly.

**Necessary preliminary tasks:**

- Remove front wheel.
- Only on right with ride height sensor: Release link at wishbone.



Undo nut at control joint.

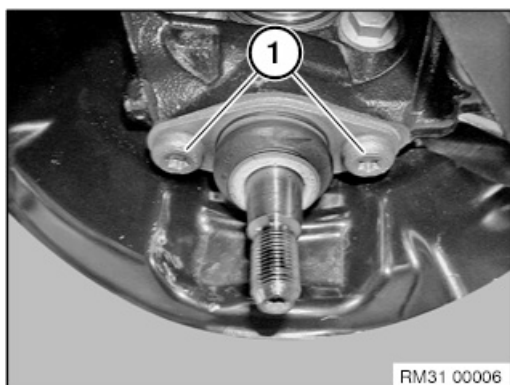
Tightening torque 31 12 1AZ.

Use special tool 31 2 310 to press wishbone from swivel bearing.

Installation note:

Keep pin of wheel control joint and bush of wishbone free of dirt, oil and grease.

Renew nut.



Release screws (1).

Remove guide joint from swivel bearing.

Tightening torque 31 12 2AZ.

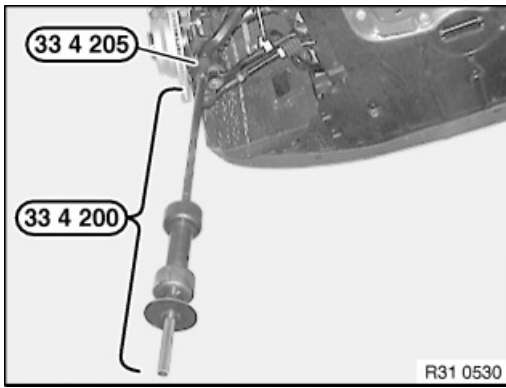
Installation note:

Recondition thread in swivel bearing.

Keep guide joint and mounting in swivel bearing clean and free from oil and grease.

Renew screws.





Guide joint tightly seated in swivel bearing:

Attention!

The guide joint must be replaced once it has been driven out with the special tool.

33 4 205 Unscrew nut and screw special tool onto guide joint.

33 4 200 Drive guide joint out of swivel bearing with special tool .



After installation:

- Carry out wheel alignment procedure.



**Warning!**

Risk of burning!

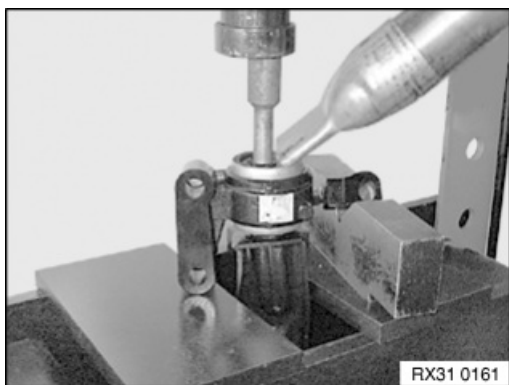
Wear gloves.

**Important!**

Brackets and rubber mounts must always be replaced as a pair on JOHN COOPER WORKS and R60, R61.

**Necessary preliminary tasks:**

- Remove wishbone.

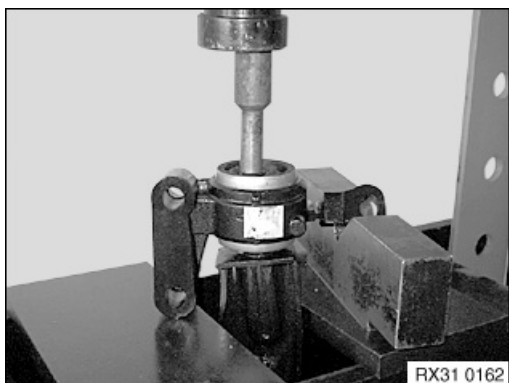


Mount wishbone as pictured on press.

Heat rubber mount with hot air blower.

Note:

When pressing out the wishbone, ensure that the inner sleeve of the rubber mount does not remain on the wishbone pin.



Force wishbone with press and a suitable tool out of rubber mount.

Replace rubber mount

**Important!**

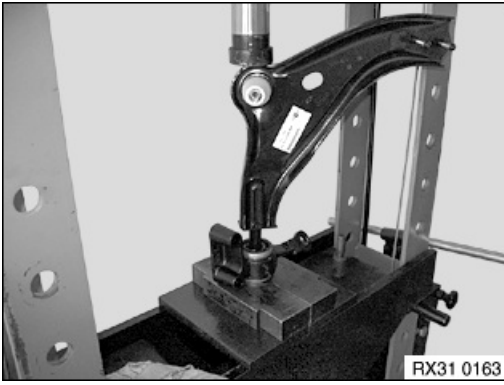
Bolt holder and wishbone to front axle support immediately.

Leave car for at least 30 minutes in unladen position and avoid spring deflections!

The lubricant takes 30 minutes to evaporate. The wishbone is fixed in the correct position in the rubber mount.

Non-conformance with these procedures could lead to serious impairment of handling!





Apply a generous coating of Circo Light (sourcing reference: BMW Parts Department) to wishbone pin and inner sleeve of rubber mount.

Lay holder on work surface of press.

Align wishbone to Holder and press from above into rubber mount (up to stop).

Note:

Gap between wishbone and rubber mount is 6 ± 2 mm after installation.

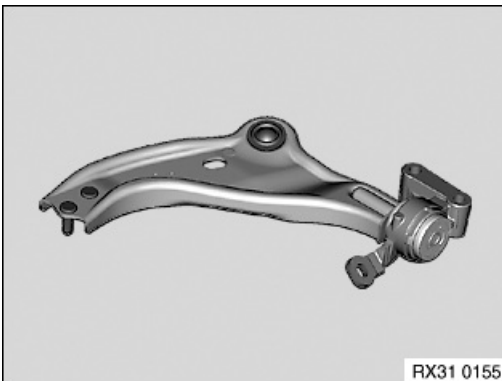


**Important!**

R60: With vehicles until 09.2010, replace wishbones in pairs only.
With vehicles "John Cooper Works" and R60, R61 replace rubber mounts in pairs only.

**Necessary preliminary tasks:**

- Remove wishbone.



Detach holder with rubber mount from wishbone.

Check rubber mount for damage, replace rubber mount if necessary.

**After installation:**

- Carry out wheel alignment procedure.

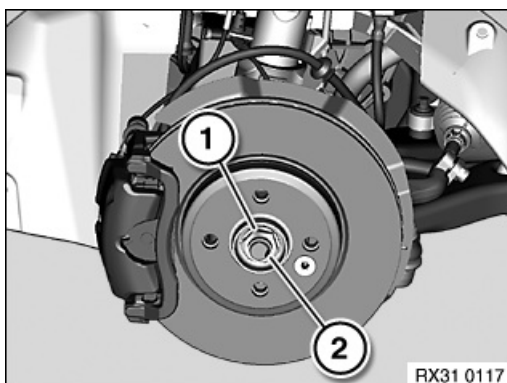


**Note:**

If the swivel bearing is replaced, a wheel alignment must be carried out after installation.

**Necessary preliminary work:**

- Remove front wheel.

**Caution!**

Expand anti-twist lock sufficiently to avoid damaging thread when releasing collar nut!

Release collar nut (1), press brake pedal to floor for this purpose.

Tightening torque 31 60 2AZ.

Installation note:

Replace collar nut, oil collar nut/wheel bearing contact surface only and tighten down.

No oil permitted on thread of shaft journal or collar nut.

Secure collar nut on flattened area (2) of output shaft by positive caulking.

**Caution!**

To avoid damaging the anti-roll bar link, remove the anti-roll bar link from the stabilizer
must be removed!

Remove brake disc.

pulse generator from swivel bearing and expose line up to engine support.

Remove track rod end from swivel bearing.

Remove wishbone from wheel guide joint.

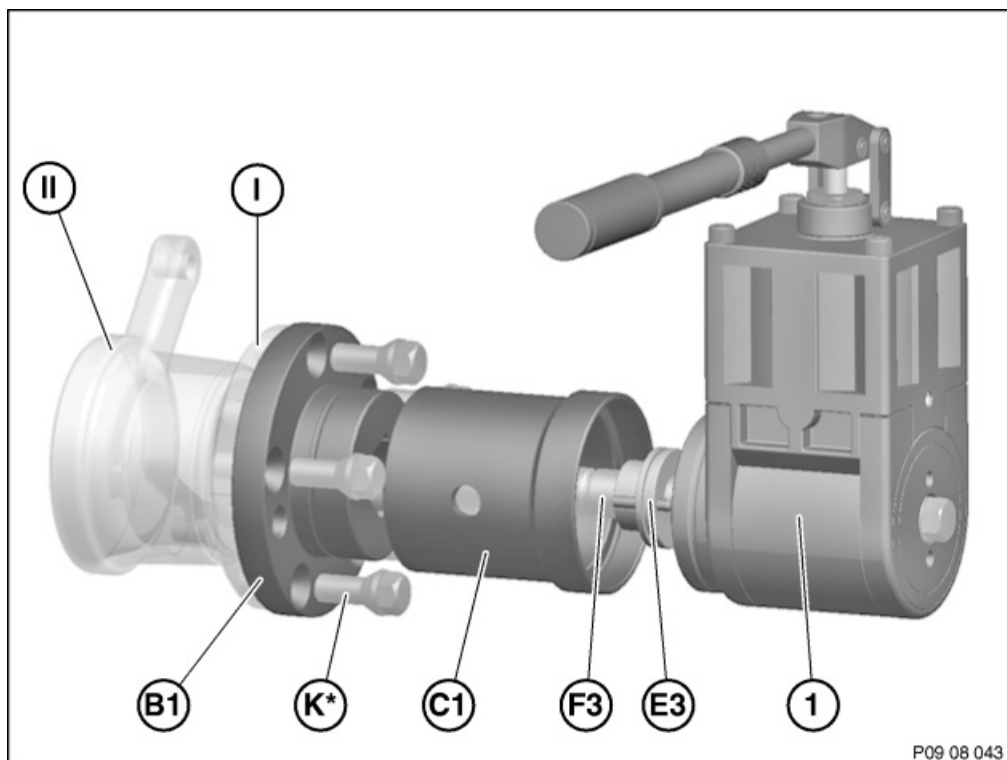


Use **special tool** , see **BMW Workshop Catalogue**.

- Hydraulic unit - 81 64 2 155 744
- Adapter kit 1 - 81 64 2 155 745
- Adapter kit 2 - 81 64 2 155 746
- Adapter - 81 64 2 318 661

The following operations describe the way in which the output shaft is pressed out of the drive flange.





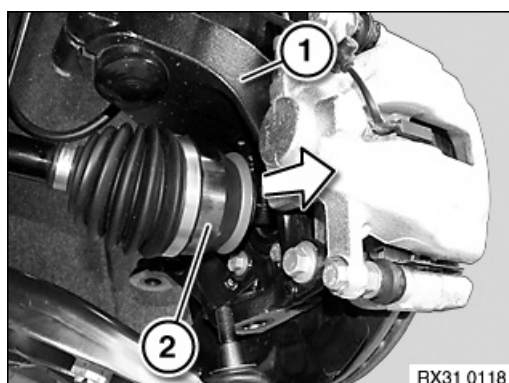
The following tools are required to press out the output shaft from the drive flange, see graphic for arrangement:

Vehicle components:

I	Drive flange hub
II	Wheel carrier/swivel bearing

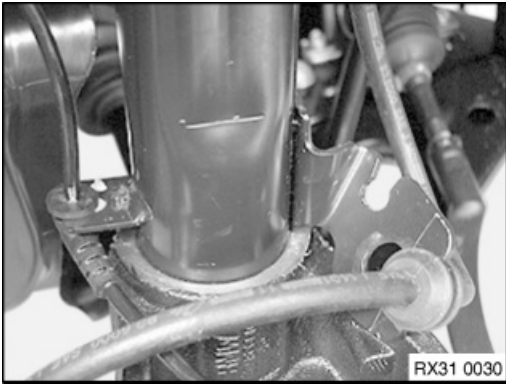
Required components for all models and types:

1	Hydraulic unit
E3	Washer M24
F3	Spindle M24 (length 270 mm)
C1	Holding sleeve
K2	Screws M14 x 1.5
B1	Adapter

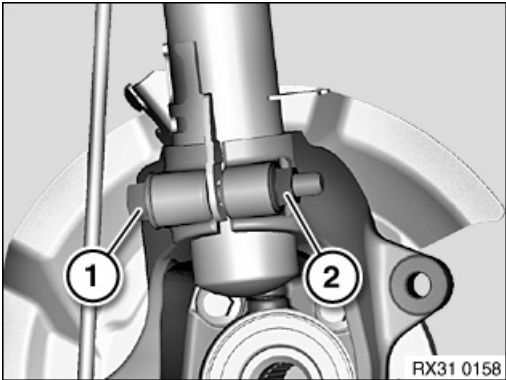


Press swivel bearing (1) outwards and remove output shaft (2) from wheel bearing.





Detach brake hose from holder.



Caution!

The connection must be tightened to the specified torque via the nut!

Support swivel bearing with workshop jack.

Slacken nut (2).

Tightening torque 31 31 3AZ.

Pull out screw (1) and remove swivel bearing by pulling downward.

Installation note:

Keep swivel bearing to spring strut connection clean and free from oil and grease.

Bolt head points in direction of travel.

Replace screw and nut.

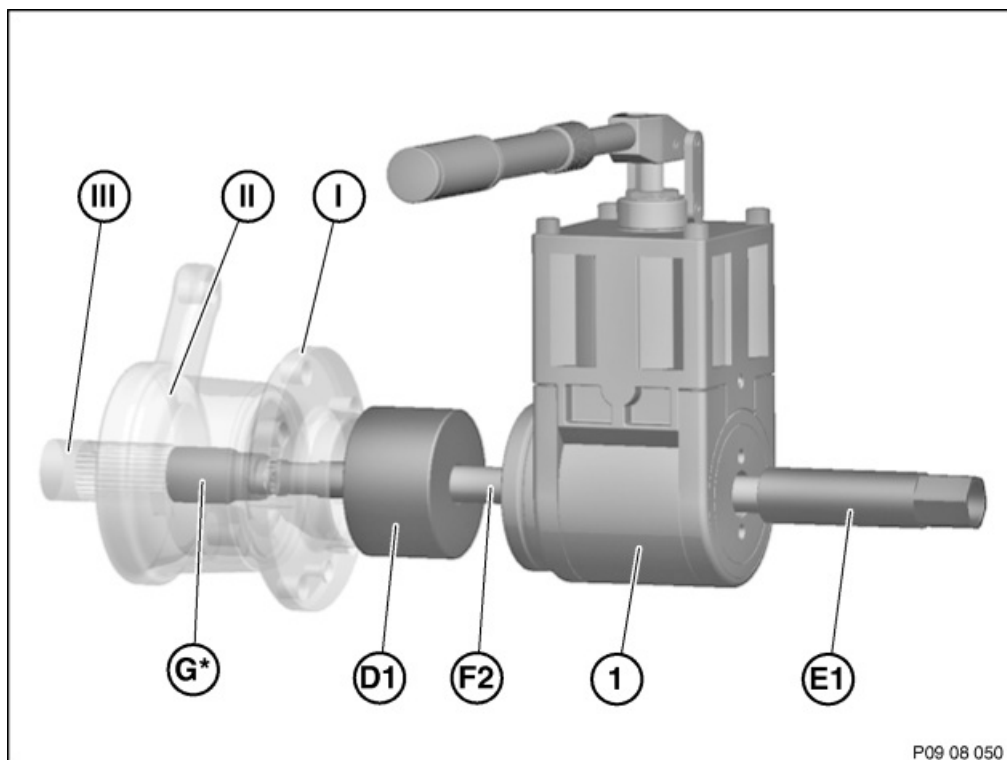


Replacement:

- Modify wheel bearing
- Modify caliper carrier/protective plate .
- Modify guide joint.

The following operations describe drawing in the output shaft:





The following tools are required to fit the output shaft in the drive flange, see graphic for arrangement:

Vehicle components:

I	Drive flange hub
II	Wheel carrier/swivel bearing
III	Output shaft

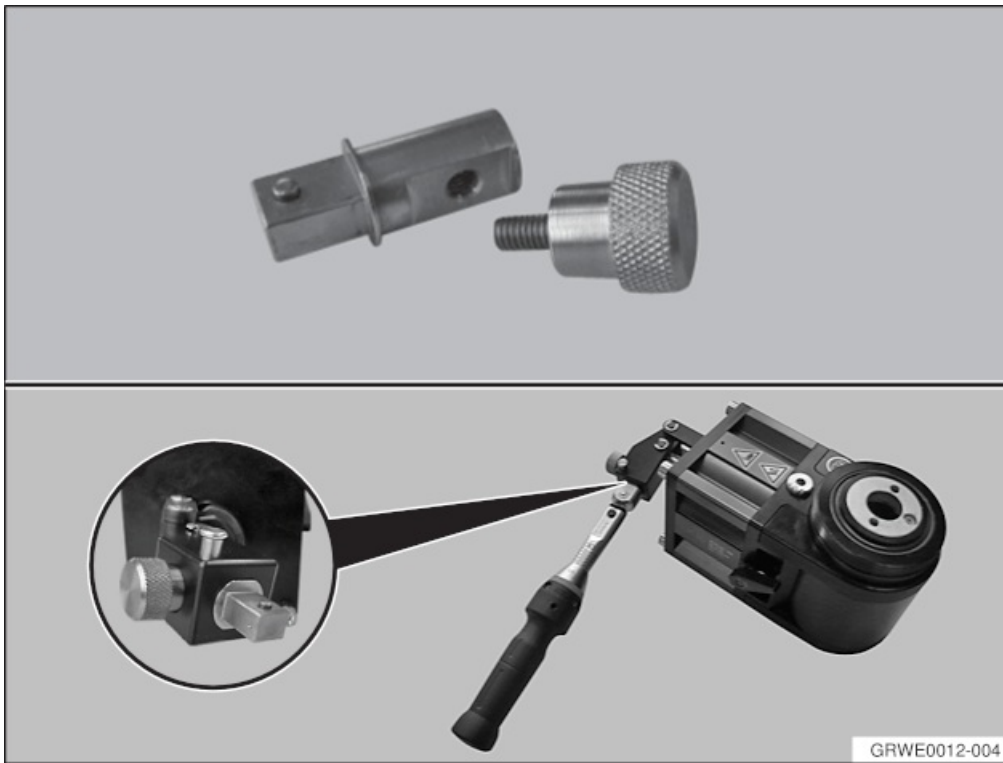
Required components for all models and types:

1	Hydraulic unit
E1	Holding sleeve M24
D1	Washer
F2	Spindle M24 / M20 (length 335 mm)

Components specific to model and type (thread diameter, output shaft):

G4	Adapter M22 x 1.5 to M20
----	--------------------------





Caution! Risk of damage!

The G4 special tool sleeve used has relatively thin walls due to its technical requirements. So that the load limits of the clamping sleeve are not exceeded when pulling in the output shaft, the adapter 81 64 2 318 661 must be used together with a torque wrench.

Fit adapter with torque wrench to hydraulic unit (see graphic).

Set torque wrench to 20 Nm.

Draw in output shaft with hydraulic tool until the torque wrench is activated.



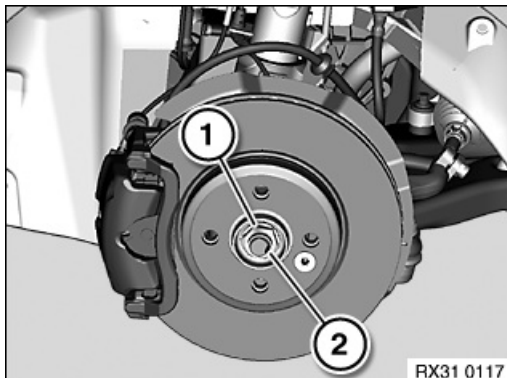
After installation:

- Replacement only: Carry out wheel alignment procedure.



**Necessary preliminary work:**

- Remove front wheel.

**Important!**

Expand anti-twist lock (2) sufficiently to avoid damaging thread when releasing collar nut.

Release collar nut (1), press brake pedal to floor for this purpose.

Tightening torque 31 60 2AZ.

Installation note:

Replace collar nut, oil collar nut/wheel bearing contact surface only and tighten down.

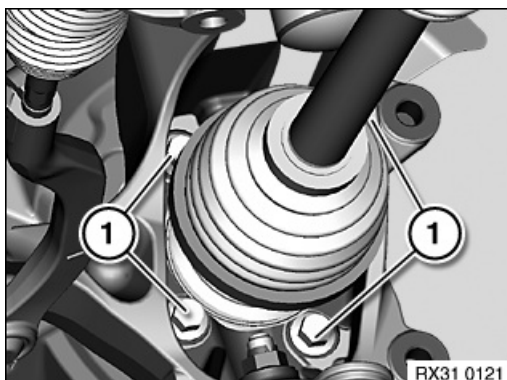
No oil permitted on thread of shaft journal or collar nut.

Secure collar nut on flattened area (2) of output shaft by positive caulking.



Remove brake disc.

Remove pulse generator from swivel bearing



Release screws (1).

Tightening torque 31 21 1AZ.

Installation note:

Replace screws (1).

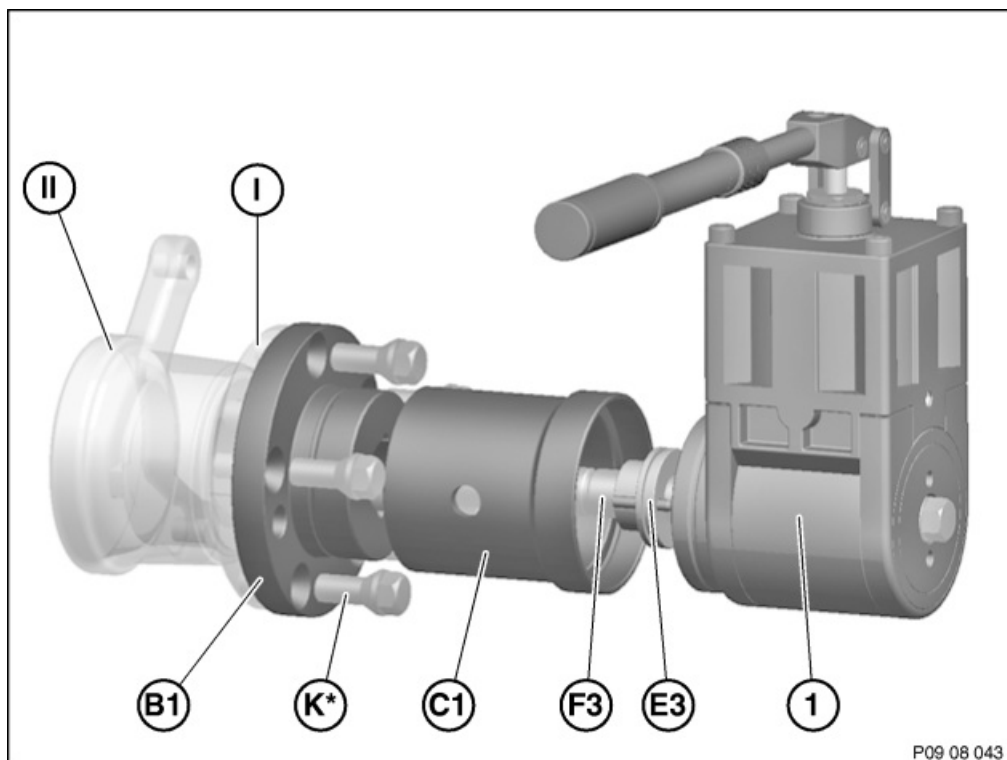


Use **special tool** , see **BMW Workshop Catalogue**.

- Hydraulic unit - 81 64 2 155 744
- Adapter kit 1 - 81 64 2 155 745
- Adapter kit 2 - 81 64 2 155 746
- Adapter - 81 64 2 318 661

The following operations describe the procedure for pulling the wheel bearing/wheel hub off the output shaft:





The following tools are required to pull the wheel bearing/wheel hub off the output shaft; see graphic for arrangement:

Vehicle components:

I	Drive flange hub
II	Wheel carrier/swivel bearing

Required components for all models and types:

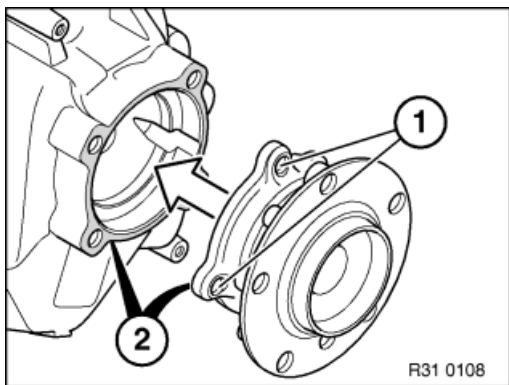
1	Hydraulic unit
E3	Washer M24
F3	Spindle M24 (length 270 mm)
C1	Holding sleeve
K2	Screws M14 x 1.5
B1	Adapter

Important!

Secure wheel bearing with flange-mounted special tool to prevent it from falling.

Pull wheel bearing off the drive shaft using the hydraulic tool.

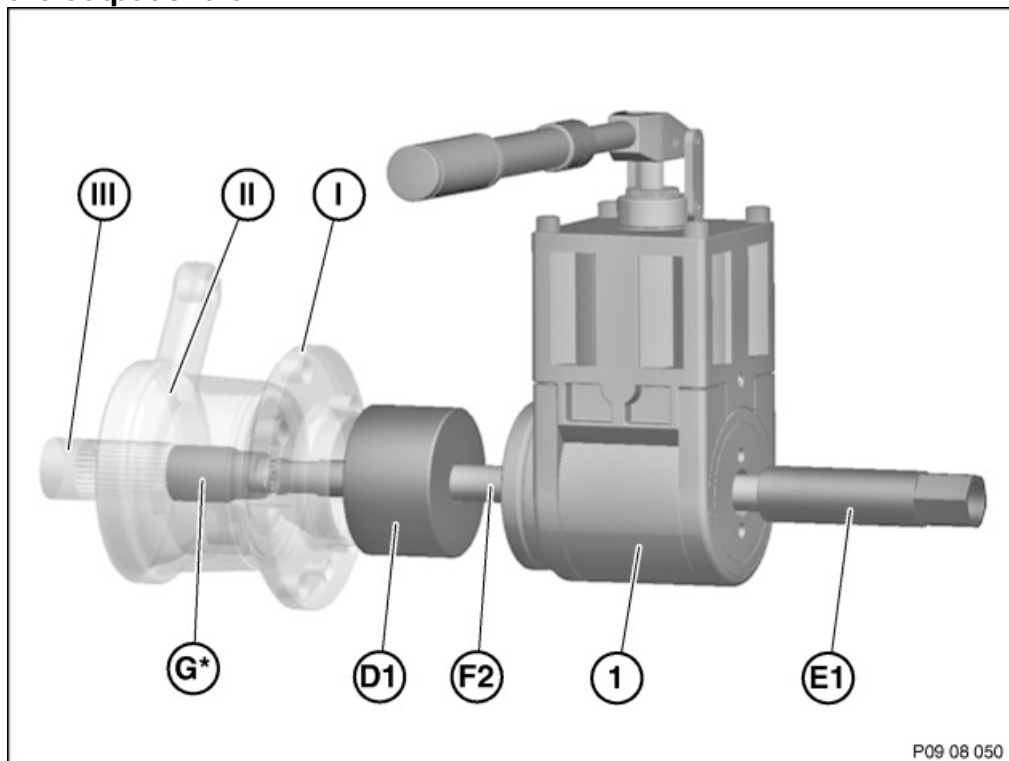




Installation note:

- Keep contact surface (2) of wheel bearing and swivel bearing clean and free from grease.

The following operations describe the procedure for pulling the wheel bearing/wheel hub onto the output shaft:



The following tools are required to pull the wheel bearing/wheel hub onto the output shaft; see graphic for arrangement:

Vehicle components:

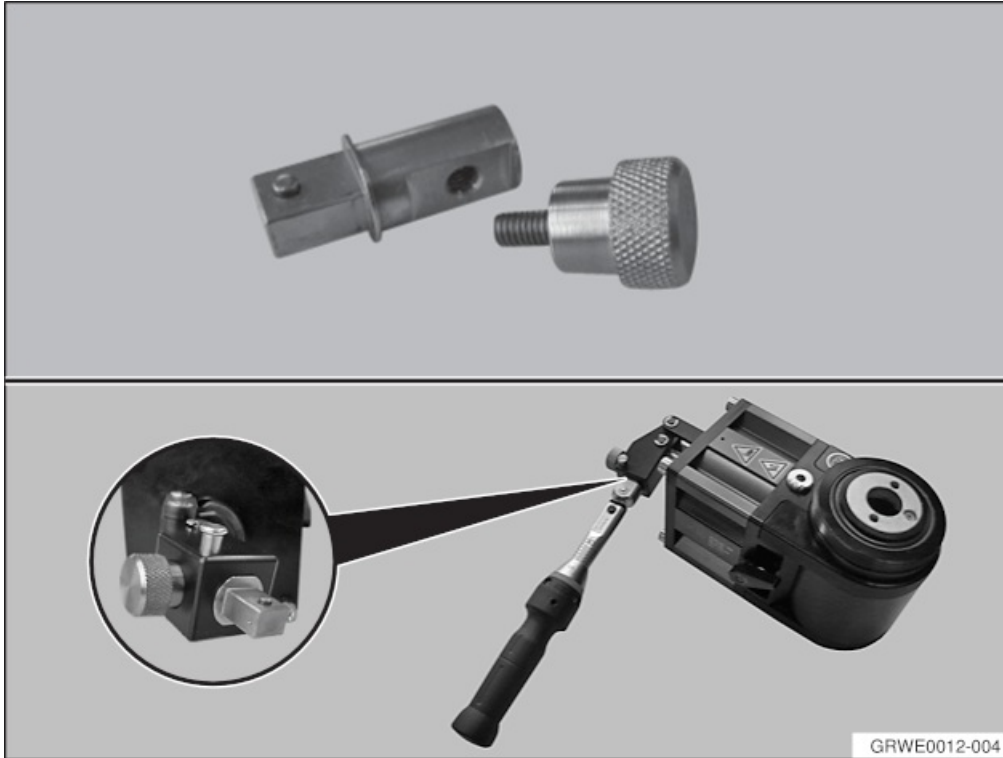
I	Drive flange hub
II	Wheel carrier/swivel bearing
III	Output shaft

Required components for all models and types:

1	Hydraulic unit
E1	Holding sleeve M24
D1	Washer
F2	Spindle M24 / M20 (length 335 mm)

Components specific to model and type (thread diameter, output shaft):





Important! Risk of damage!

The G4 special tool sleeve used has relatively thin walls due to its technical requirements. So that the load limits of the clamping sleeve are not exceeded when pulling in the output shaft, the adapter 81 64 2 318 661 must be used together with a torque wrench.

Fit adapter with torque wrench to hydraulic unit (see graphic).

Set torque wrench to 20 Nm.

Pull wheel bearing/wheel hub with hydraulic tool onto output shaft until the torque wrench is triggered.



31 00 ... Information on replacing shock absorbers

Situation:

When a shock absorber is faulty on one side (leaking, noises, limit values exceeded on the shock tester), often both shock absorbers on the axle in question are replaced.

Effect:

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as defective parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure:

If one shock absorber is damaged, it is only necessary to replace both shock absorbers when the car has driven in excess of 80 000 km.



**Special tools required:**

- 31 5 220

**Important!**

If the centring pin is missing from the support bearing, the position of the threaded bolts to the wheel arch must be marked so that the original camber is approximately maintained.

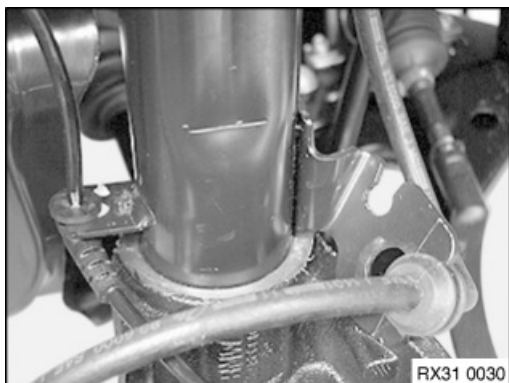
Only one nut may ever be released for marking.

**Installation note:**

1. All screws, nuts, bolts and hose clamps removed during the repair must be replaced.
2. Retaining elements on chassis and suspension and steering parts must be replaced.

**Necessary preliminary tasks:**

- Remove front wheel.
- Remove track rod end from swivel bearing.
- Remove anti-roll bar link from spring strut.



Detach brake hose from spring strut.

**Warning!**

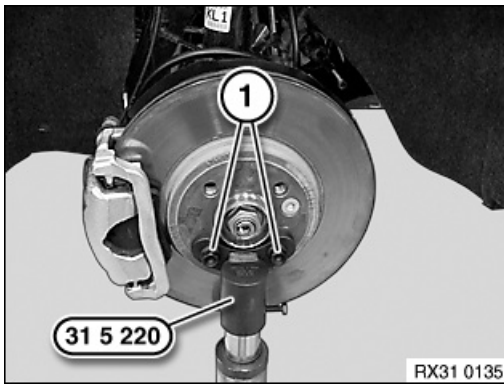
Danger of injury!

Failure to comply with the following instructions may result in the vehicle slipping off the vehicle hoist and critically injuring other persons.

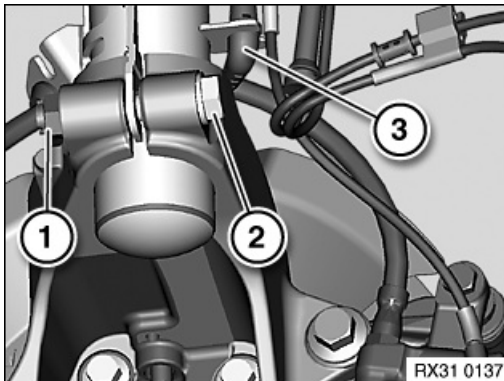
When supporting components, make sure that:

- The vehicle can no longer be raised or lowered.
- the vehicle does not lift off the locating plates on the vehicle hoist.





Secure special tool 31 5 220 to the wheel bearing with wheel studs (1).
Support swivel bearing with workshop jack.



Detach pulse sensor (3) from spring strut.
Release nut (1) and remove screw (2).
Tightening torque 31 31 3AZ.
Carefully lower the workshop jack until the spring strut can be removed.

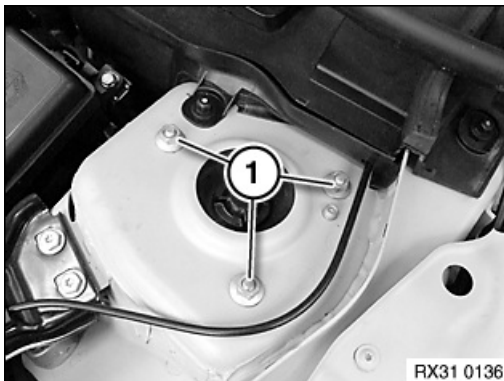
Installation note:

Keep press fit of swivel bearing and spring strut in lower area clean and free from oil and grease.

Replace self-locking nuts.

R5x: **Tighten only via screw.**

R6x, , **Tighten only via screw.**



Centring pin missing: Make position of threaded bolt in relation to wheel arch.

Secure spring strut against falling out.

Unscrew nuts (1).

Tightening torque 31 31 1AZ.

Remove spring strut downwards out of wheel arch.

Installation note:

Clean contact surface at spring strut dome.

Align the spring strut using the centring pin for a bore hole on the wheel arch or stud bolt with the marks on the wheel arch.

Replace self-locking nuts.



After installation:

- Carry out wheel alignment check if a spring strut with support bearing was or is installed without centring pin.



**Special tools required:**

- 31 2 210
- 31 3 340
- 31 3 341
- 31 3 351

**Important!**

- When replacing shock absorber/spring strut, renew auxiliary damper!

**Warning!**

Before using the special tool 31 3 340 take care to read through the Owner's Handbook!

All the safety information and instructions contained in the Owner's Handbook must be strictly observed!

Failure to observe these safety precautions and instructions increases the risk of serious physical injury, damage to your health and damage to property and equipment!

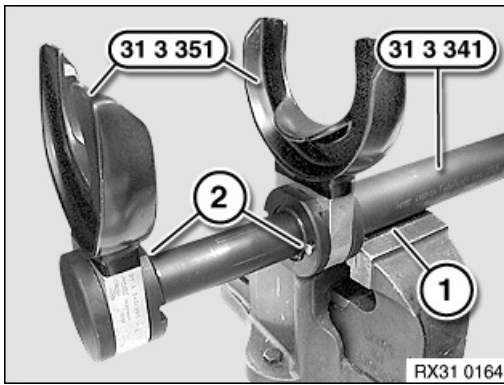
**Important!**

1. Prior to each use, check the special tools for defects, modifications and operational reliability.
2. Damaged/modified special tools must not be used!
3. No changes or modifications may be made to the special tools!
4. These special tools are intended solely for the purpose of tightening and relieving cylindrical and tapered suspension springs.
5. Keep special tools dry, clean and (down to the spindle) free from grease.
6. Impact screwdrivers are prohibited!
7. Do not compress coil spring to full extent.

**Necessary preliminary work:**

- Remove front spring strut.





Removing:

Clamp special tool 31 3 341 with guide (1) in vice.

Fit special tools 31 3 351 from above on special tool 31 3 341 until retaining bolts (2) can be felt and heard to snap into place.

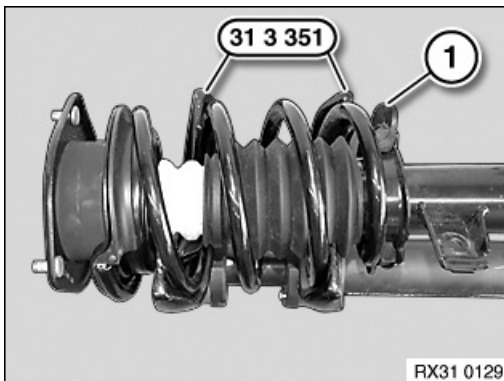
Check seating of special tools 31 3 351 and, if necessary, correct.



Warning!

Coils of coil spring must be located completely in recesses of special tools 31 3 351 when tensioned!

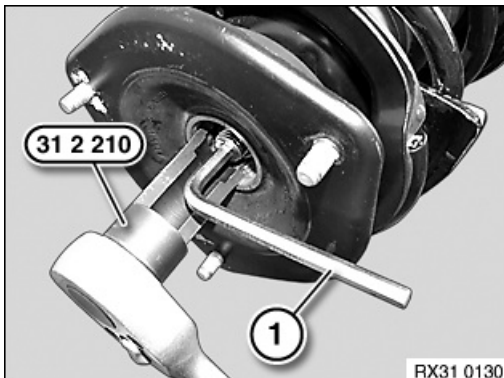
Compress coil spring until stress on piston rod is relieved.



Clean coil spring to remove all coarse dirt and mount on special tools 31 3 351 .

Turn spring strut until end of coil spring (1) points upwards.

Compress coil spring until stress on piston rod is relieved.

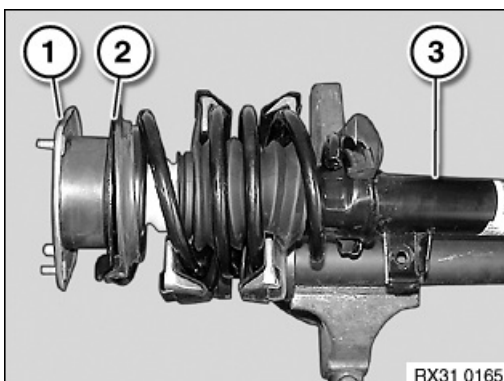


Warning!

Nut may only be released when the upper and lower coils of the coil spring are located completely in the recess of the spring holder!

Take off protective cap.

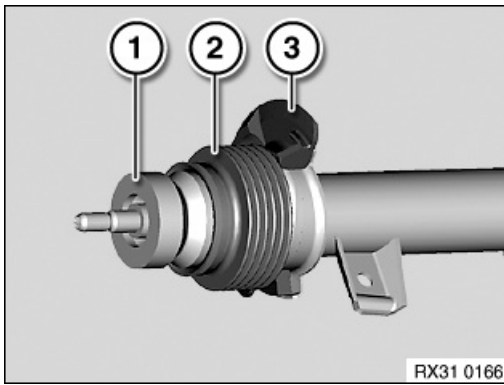
Release nut with special tool 31 2 210 and; if necessary, grip piston rod with spanner.



Remove support bearing (1), shim and upper spring cup (2).

Remove spring strut (3) with auxiliary damper and protective tube sideways from tensioned coil spring.





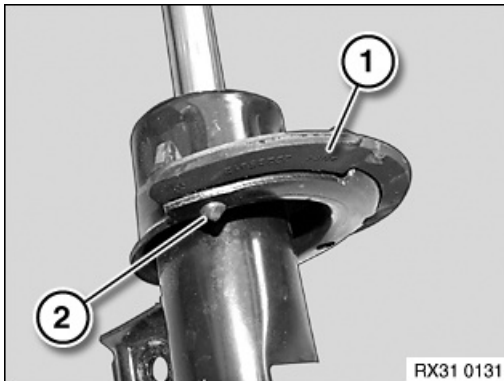
Remove auxiliary damper (1) with protective tube (2) and lower spring pad (3) from shock absorber.

Installation:

Check auxiliary damper (1), protective tube (2) and lower spring pad (3) for damage, replace if necessary.

Attach lower spring pad (3) to spring cup.

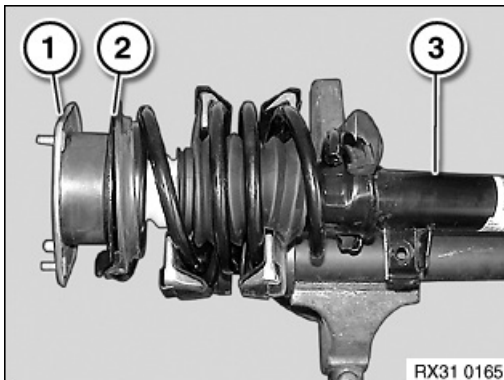
Attach auxiliary damper (1) with protective tube (2) to piston rod.



Note:

Make sure rubber knob (2) is correctly positioned in spring cup bore.

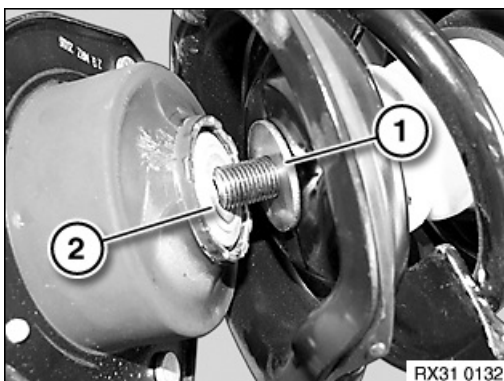
1 = Lower spring pad



Insert spring strut (3) in tensioned coil spring.

Check upper spring pad for damage, replace if necessary.

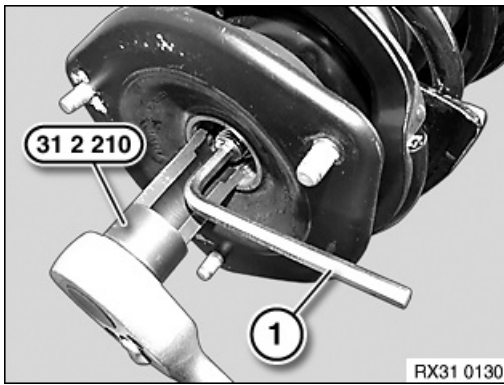
Connect upper spring cup (2), shim and support bearing (1) to piston rod.



Note:

Mount shim (1) and dust sleeve (2) correctly between support bearing and upper spring cup.

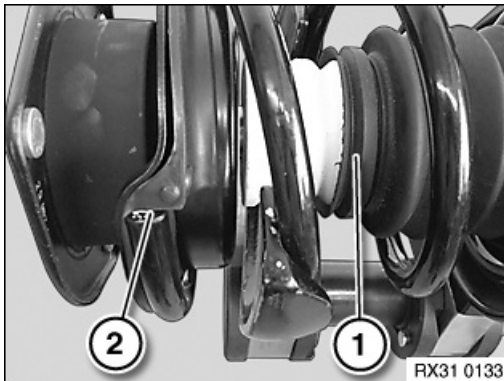




Replace nut, screw onto piston rod and tighten down with special tool 31 2 210 .

Tightening torque 31 31 2AZ.

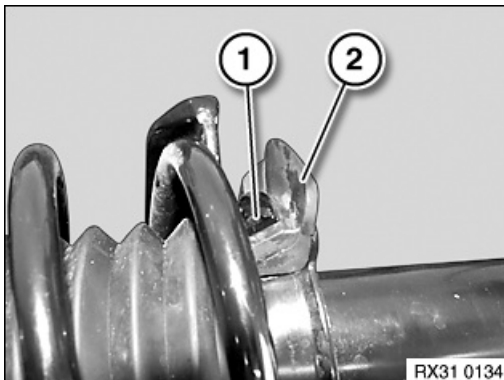
Fit cover cap.



Note:

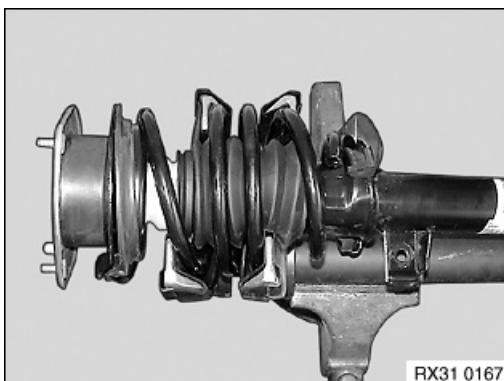
End of coil spring (2) at top must rest on indentation in upper spring cup and spring pad.

Check installation position of protective tube (1), correct if necessary.



Note:

End of lower coil spring (1) must rest on stop of spring pad (2).



Align all components correctly to each other and relieve tension on coil spring.



After installation:

- Carry out wheel alignment if a spring strut with support bearing was or has been installed without centring pin.



**Necessary preliminary tasks:**

- Move vehicle into normal position



Determine actual ride level (A).

Attach tape measure to rim flange at bottom middle and measure to wheel arch trim.



31 33 100 Removing and installing/replacing coil spring for front left or front right spring strut



Installation note:

1. All screws, nuts, bolts and hose clamps removed during the repair must be replaced.
2. Retaining elements on chassis and suspension and steering parts must be replaced.



Important!

Both coil springs on the relevant axle must be replaced only in the event of corrosion breakage!

For all E70/E71/E72 vehicles: When replacing coil spring, always renew spring pad at bottom

Note:

The coil spring is allocated in the Electronic Parts Catalogue (EPC) under the "Spring table" menu item after the vehicle identification number has been entered and the optional equipment of the particular vehicle has been selected.



Note:

Procedure is described in the document "Replacing front left or right spring strut".



After installation:

- Check headlight adjustment, correct if necessary.



*Installation note:*

1. All screws, nuts, bolts and hose clamps removed during the repair must be replaced.
2. Retaining elements on chassis and suspension and steering parts must be replaced.

*Note:*

Procedure is described in the document "Replacing front left or front right spring strut shock absorber".

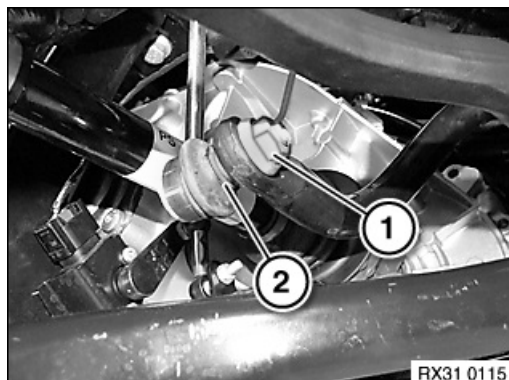
**After installation:**

- Carry out wheel alignment check if a spring strut with support bearing was or has been installed without centring pin.



**Necessary preliminary tasks:**

- Lower front axle support.

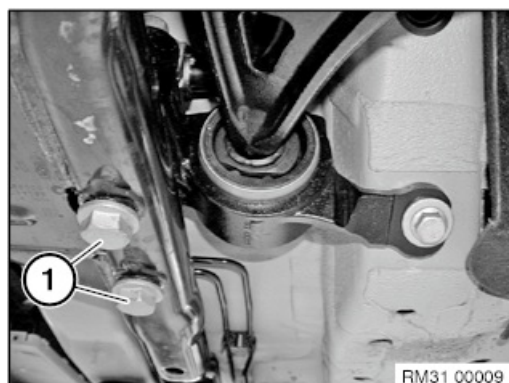


Release nut (1); if necessary, grip dihedron (2) or hexagon socket.

Tightening torque 31 35 1AZ

Installation note:

Replace nut.



Release left and right screws (1).

Tightening torque 31 35 3AZ.

Remove anti-roll bar (2) from wishbone holder.

**Replacement:**

- Renew rubber mounts on anti-roll bar.

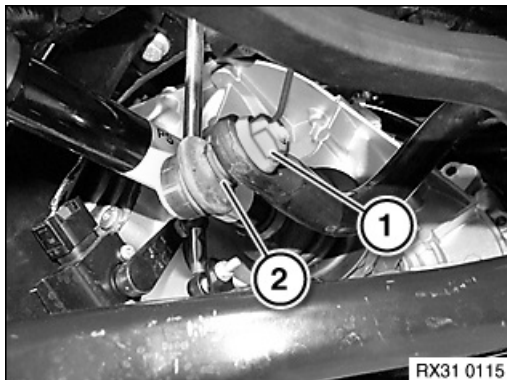


31 35 005 Removing and installing/replacing push rod (anti-roll bar link) for left/right anti-roll bar



Necessary preliminary work:

- Remove front wheel

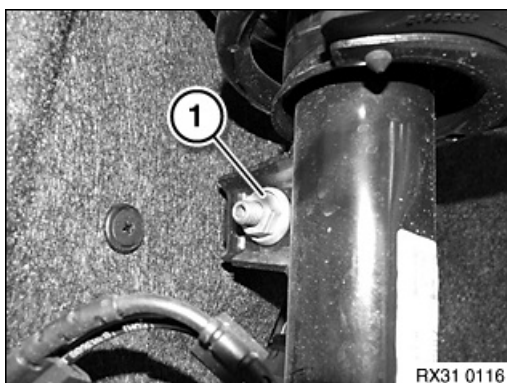


Release nut (1); if necessary, grip dihedron (2) or hexagon socket.

Tightening torque 31 35 1AZ.

Installation note:

Replace self-locking nut.

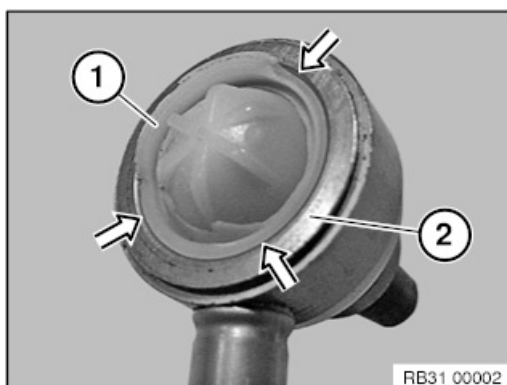


Release nut (1); if necessary, grip dihedron or hexagon socket.

Tightening torque 31 35 2AZ.

Installation note:

Replace self-locking nut.



Important!

Never tighten the anti-roll bar link with an impact wrench!

Do not twist the joint of the anti-roll bar link while tightening the nut!

Never twist the joint to hold against the screw connection!

The plastic bond (1) may never be broken as marked with arrows in area (2).

If the plastic bond is broken, the anti-roll bar link must be replaced.



31 35 021 axle support

Replacing both rubber mounts for stabilizer mounting on front



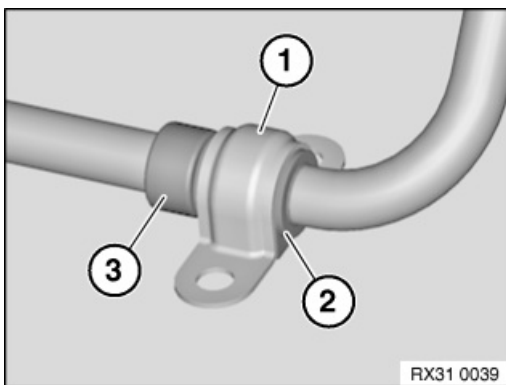
Necessary preliminary tasks:

- Remove R55, R56, R57, R58, R59: anti-roll bar.
- R60, R61: Release anti-roll bar at holder for wishbone.



Important!

Circo Light must not be used between anti-roll bar and rubber mount!



Remove retaining brackets (1).

Remove rubber mount (2) from stabilizer (2).

Installation note:

Keep anti-roll bar clean and free of oil and grease.

Make sure rubber mount (2) is correctly engaged on locating ring (3).

To install retaining bracket (1), coat rubber mount with Circo Light (sourcing reference: BMW Parts Department).

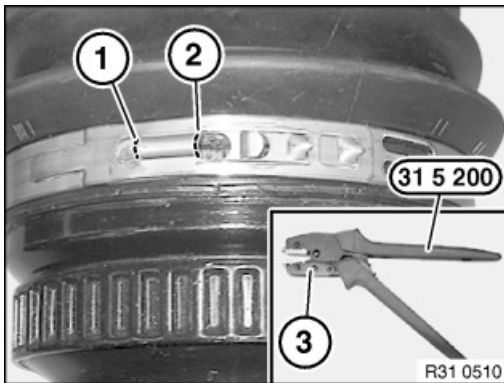


**Special tools required:**

- 31 5 200

**Important!**

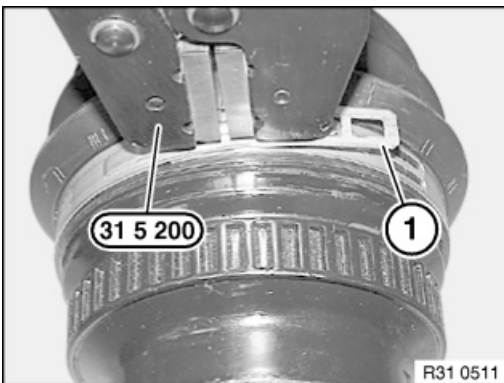
During removal Low Profile band clamp (dotted line) is overstretched and must not be reused!

**Removing:**

Place special tool 31 5 200 on tabs (1, 2).

Note:

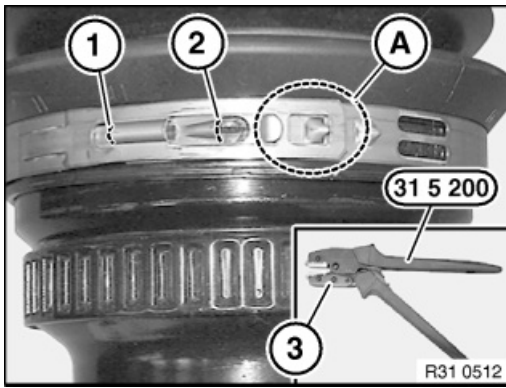
Make sure that the movable piece (3) of the special tool is placed on lug (1).



Compress Low Profile band clamp with special tool 31 5 200 until end of band clamp (1) lifts up.

Relieve tension on special tool and remove Low Profile band clamp.



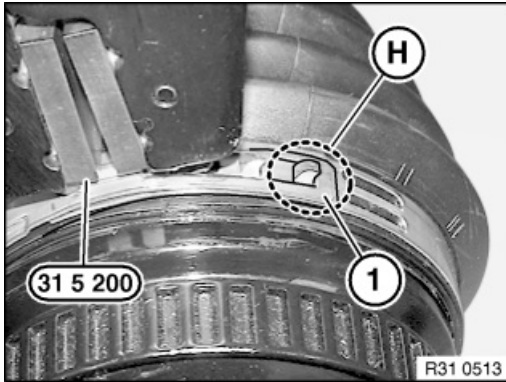


Assembly:

Position Low Profile band clamp in installation position (A) on gaiter.
Place special tool 31 5 200 on tabs (1, 2).

Note:

Make sure that the movable piece (3) of the special tool is placed on lug (1).



Check and if necessary correct positions of gaiter and Low Profile band clamp.

Compress Low Profile band clamp with special tool 31 5 200 and press on end of band clamp (1).

Relieve tension on special tool and remove.

Check hook fastener (H); if necessary, repeat operation with new Low Profile band clamp.



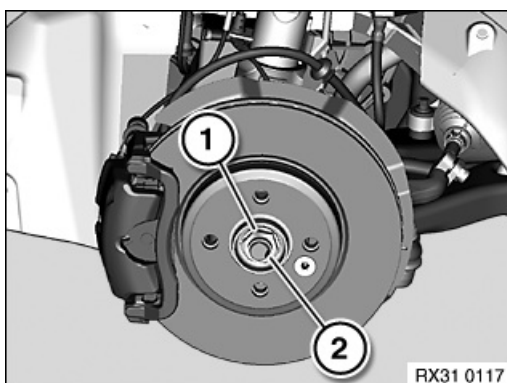
**Important!**

Manual gearbox only:

- The radial shaft seal for the output shaft should be replaced every time the output shaft is removed and installed.

**Necessary preliminary work:**

- Remove front wheel.
- Manual gearbox only: Drain and catch transmission oil.

**Important!**

Expand anti-twist lock (2) sufficiently to avoid damage to thread when releasing collar nut!

Release collar nut (1), press brake pedal to floor for this purpose.



Remove track rod end from swivel bearing on left.

Remove wishbone from left wheel control joint.

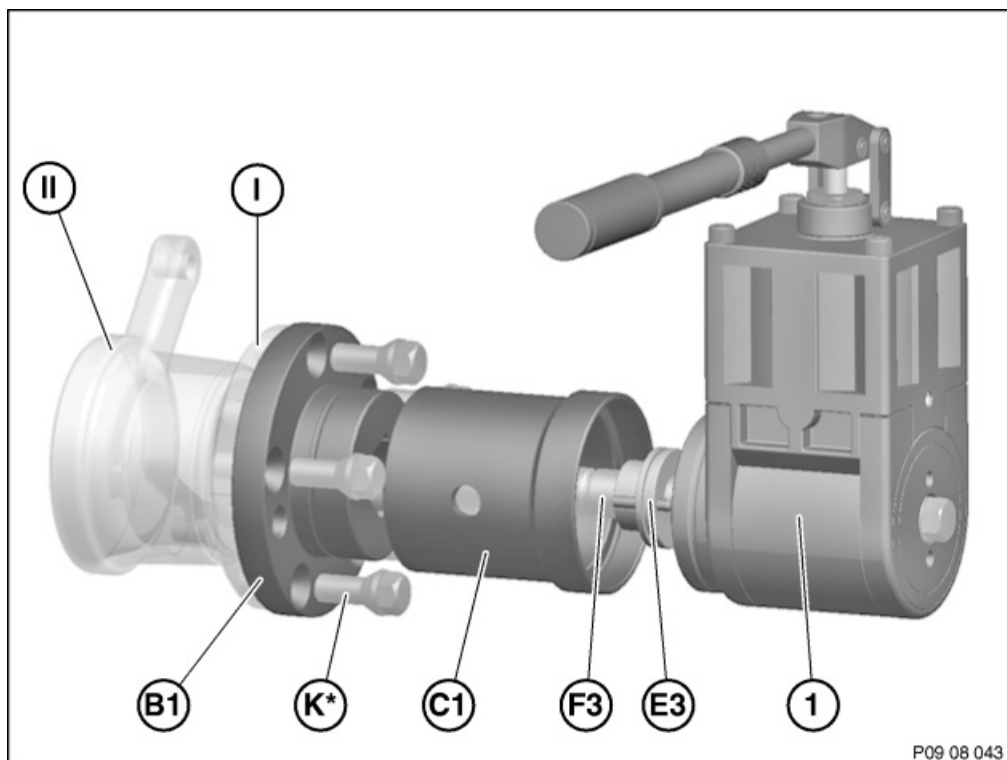


Use **special tool** , see **BMW Workshop Catalogue**.

- Hydraulic unit - 81 64 2 155 744
- Adapter kit 1 - 81 64 2 155 745
- Adapter kit 2 - 81 64 2 155 746
- Adapter - 81 64 2 318 661

The following work steps describe pressing out the output shaft:





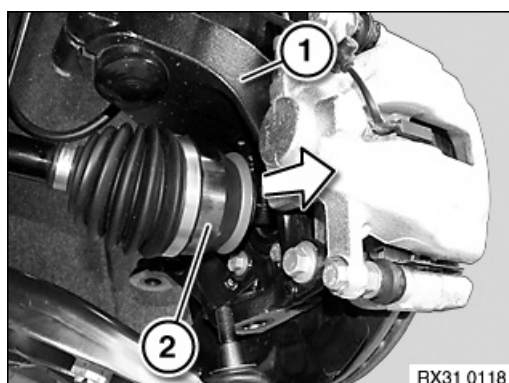
The following tools are required to press out the output shaft from the drive flange, see graphic for arrangement:

Vehicle components:

I	Drive flange hub
II	Wheel carrier/swivel bearing

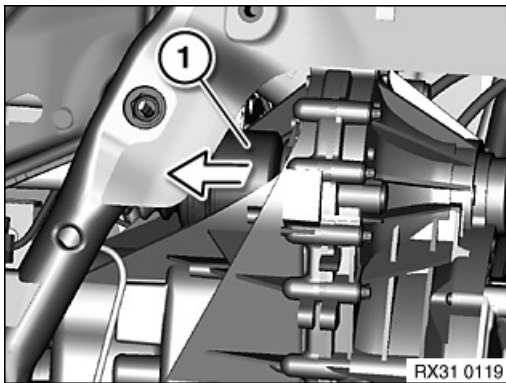
Required components for all models and types:

1	Hydraulic unit
E3	Washer M24
F3	Spindle M24 (length 270 mm)
C1	Holding sleeve
K2	Screws M14 x 1.5
B1	Adapter



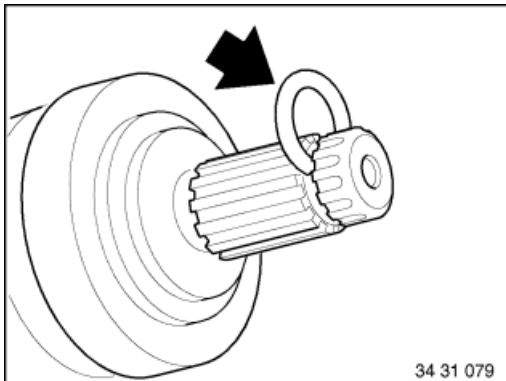
Secure output shaft against falling out.
 Press out output shaft with hydraulic unit.
 Press swivel bearing (1) outwards.
 Pull out output shaft (2).



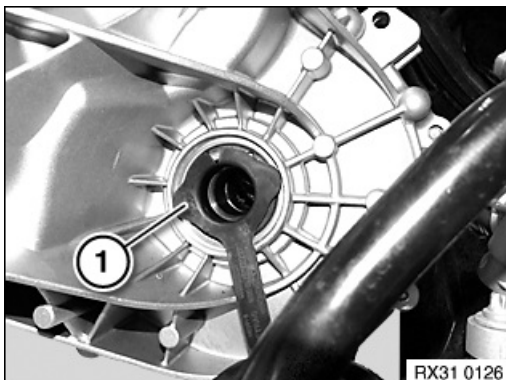


Lever output shaft (1) out of transmission and remove. *Installation note:*
Manual gearbox only:

- Renew radial shaft seal for output shaft.

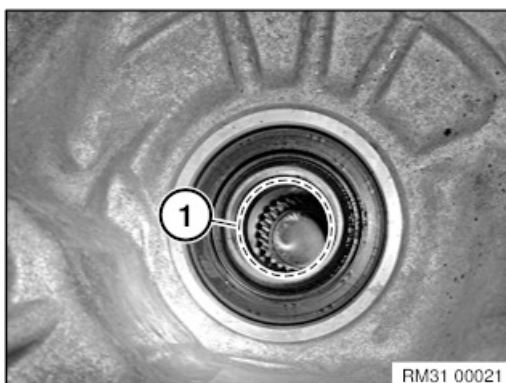


Installation note:
Replace circlip.



Installation note:

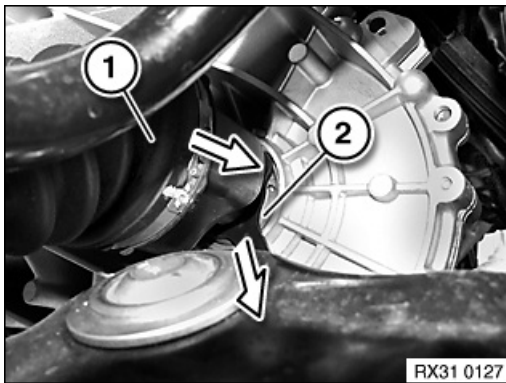
- Manual gearbox only:
Insert assembly guard (1) into radial shaft seal.
 - Assembly guard (1) is provided with new radial shaft seal for output shaft.
- Make sure the tool fits over the lip of the radial shaft seal so there is no damage to sealing ring when the output shaft is inserted.



Installation note:

- With automatic transmission only:
Replace O-ring (1).





Installation note:

Insert output shaft (1) into gearbox.

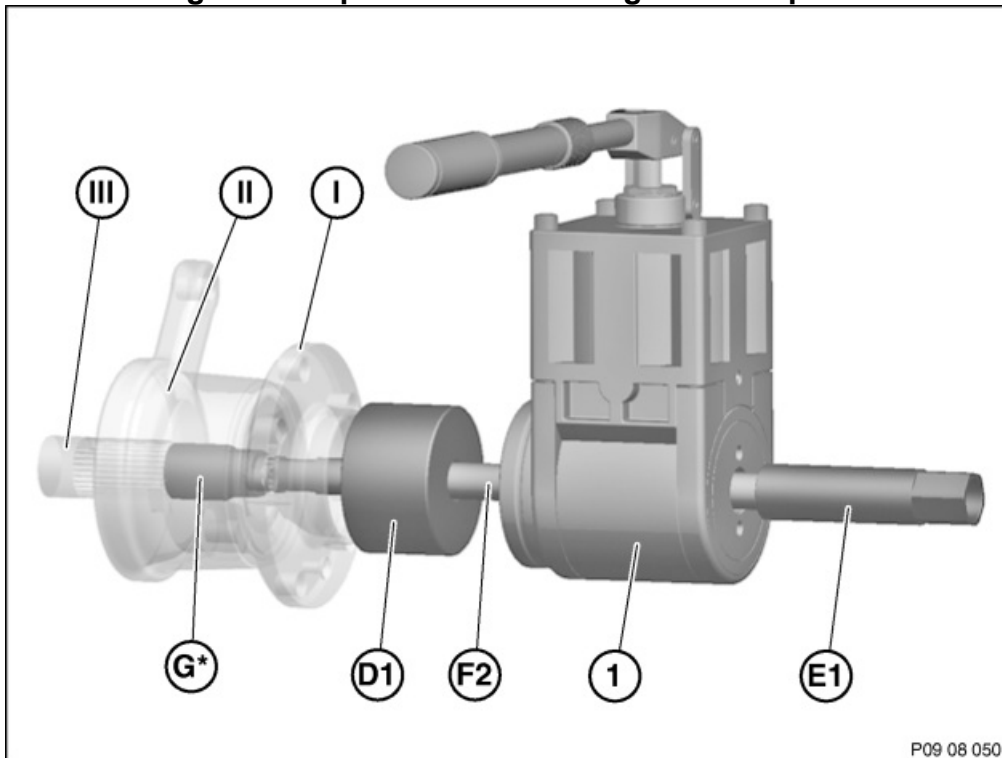
- Manual gearbox only:

Before sealing surface is pushed into radial shaft seal, remove assembly guard (2) by pulling on handle.

Slide output shaft into gearbox up to stop.

Output shaft coupling must snap audibly into place. Check output shaft is securely seated.

The following work steps describe drawing in the output shaft:



The following tools are required to fit the output shaft in the drive flange, see graphic for arrangement:

Vehicle components:

I	Drive flange hub
II	Wheel carrier/swivel bearing
III	Output shaft

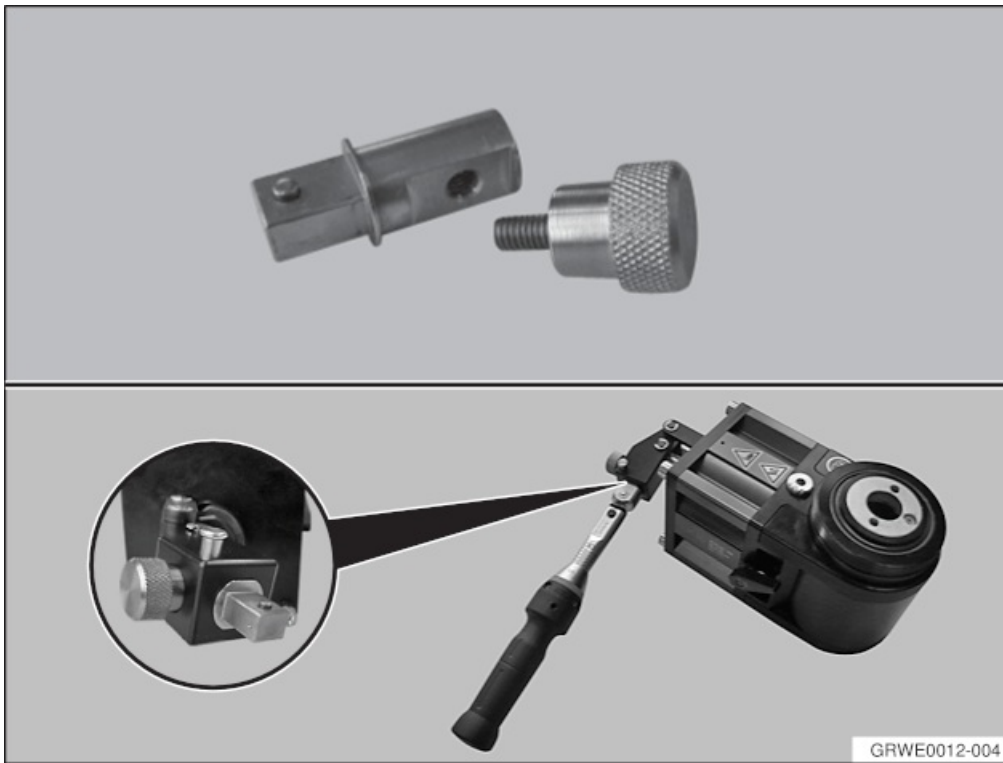
Required components for all models and types:

1	Hydraulic unit
E1	Holding sleeve M24
D1	Washer
F2	Spindle M24 / M20 (length 335 mm)

Components specific to model and type (thread diameter, output shaft):

G4	Adapter M22 x 1.5 to M20
----	--------------------------





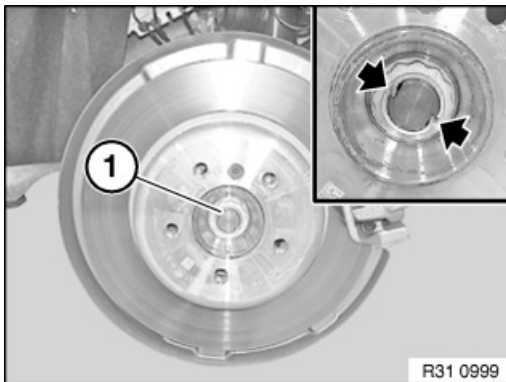
Important! Risk of damage!

The G4 special tool sleeve used has relatively thin walls due to its technical requirements. So that the load limits of the clamping sleeve are not exceeded when pulling in the output shaft, the adapter 81 64 2 318 661 must be used together with a torque wrench.

Fit adapter with torque wrench to hydraulic unit (see graphic).

Set torque wrench to 20 Nm.

Draw in output shaft with hydraulic tool until the torque wrench is activated.



Tighten collar nut (1) by operating the brake.

Tightening torque 31 60 2AZ.

Installation note:

Renew collar nut (1), apply a light coating of oil to collar nut contact surface and tighten.

No oil permitted on thread of shaft journal or collar nut.

Secure collar nut (1) by positive peening at flat areas of output shaft.



After installation:

- Manual gearbox only: Add transmission oil.
- Check gearbox for leaks

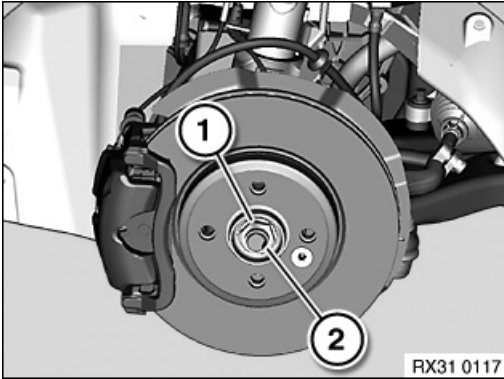


31 60 004 Removing and installing/replacing right output shaft (all-wheel drive vehicle)



Necessary preliminary work:

- Remove front wheel.



Important!

Expand anti-twist lock (2) sufficiently to avoid damage to thread when releasing collar nut!

Release collar nut (1), press brake pedal to floor for this purpose.



Remove track rod end from swivel bearing on right.
Remove wishbone from right wheel control joint.

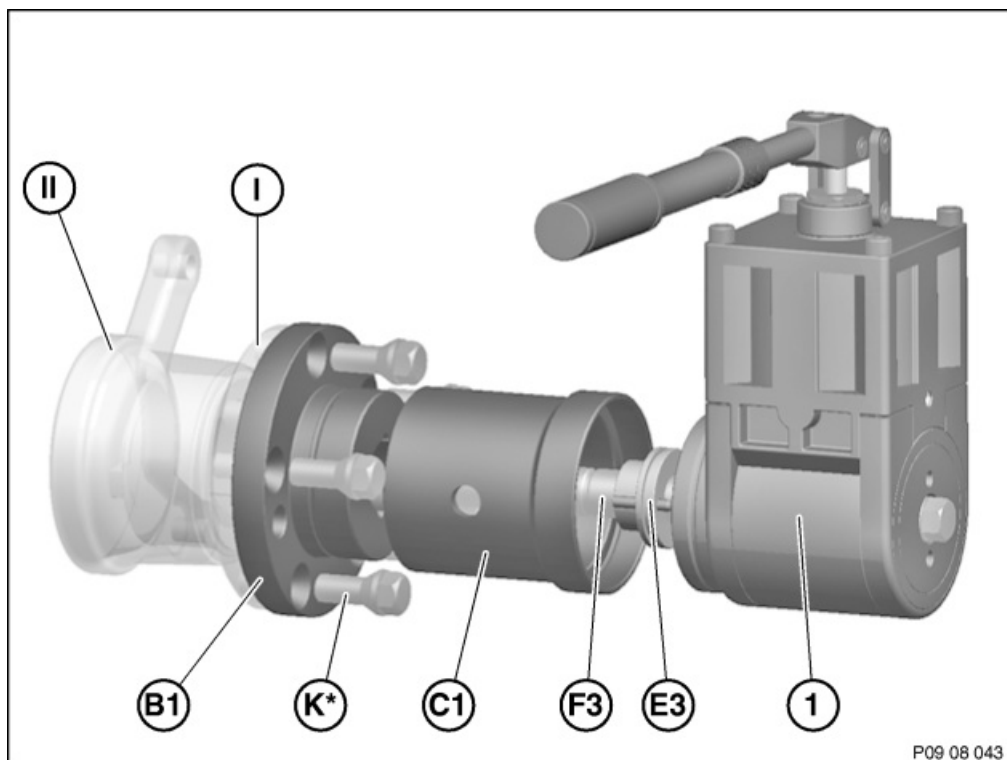


Use **special tool** , see **BMW Workshop Catalogue**.

- Hydraulic unit - 81 64 2 155 744
- Adapter kit 1 - 81 64 2 155 745
- Adapter kit 2 - 81 64 2 155 746
- Adapter - 81 64 2 318 661

The following work steps describe pressing out the output shaft:





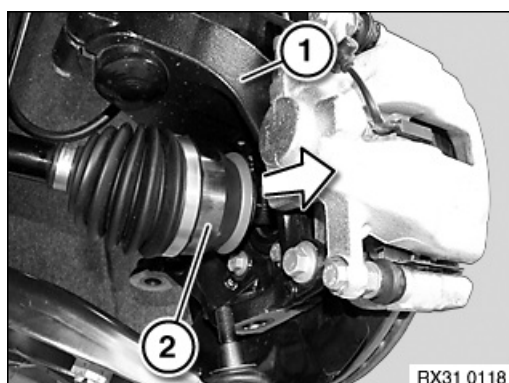
The following tools are required to press out the output shaft from the drive flange, see graphic for arrangement:

Vehicle components:

I	Drive flange hub
II	Wheel carrier/swivel bearing

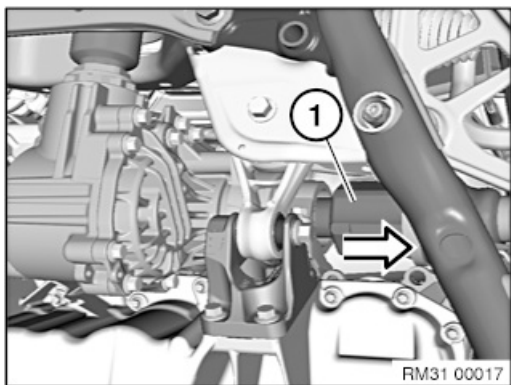
Required components for all models and types:

1	Hydraulic unit
E3	Washer M24
F3	Spindle M24 (length 270 mm)
C1	Holding sleeve
K2	Screws M14 x 1.5
B1	Adapter

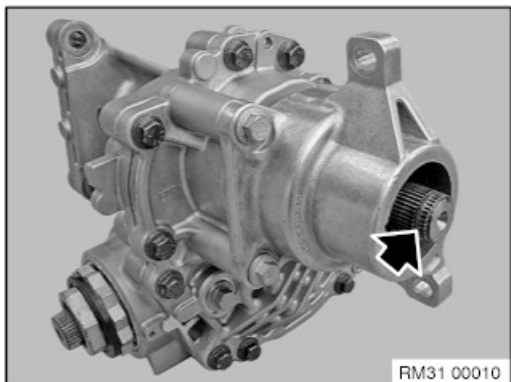


Secure output shaft against falling out.
Press out output shaft with hydraulic unit.
Press swivel bearing (1) outwards.
Pull out output shaft (2).



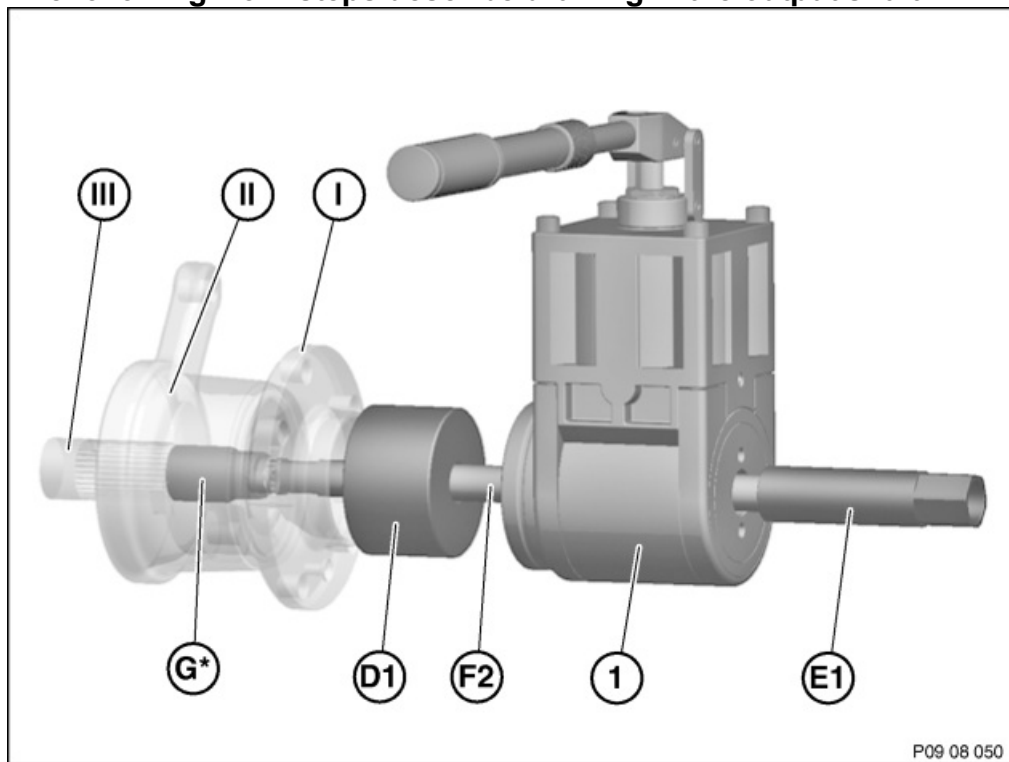


Use suitable tool to lever out output shaft (1) and take out towards right-hand side of vehicle.



Installation note:
Replace circlip.

The following work steps describe drawing in the output shaft:



The following tools are required to fit the output shaft in the drive flange, see graphic for arrangement:

Vehicle components:

I	Drive flange hub
II	Wheel carrier/swivel bearing
III	Output shaft

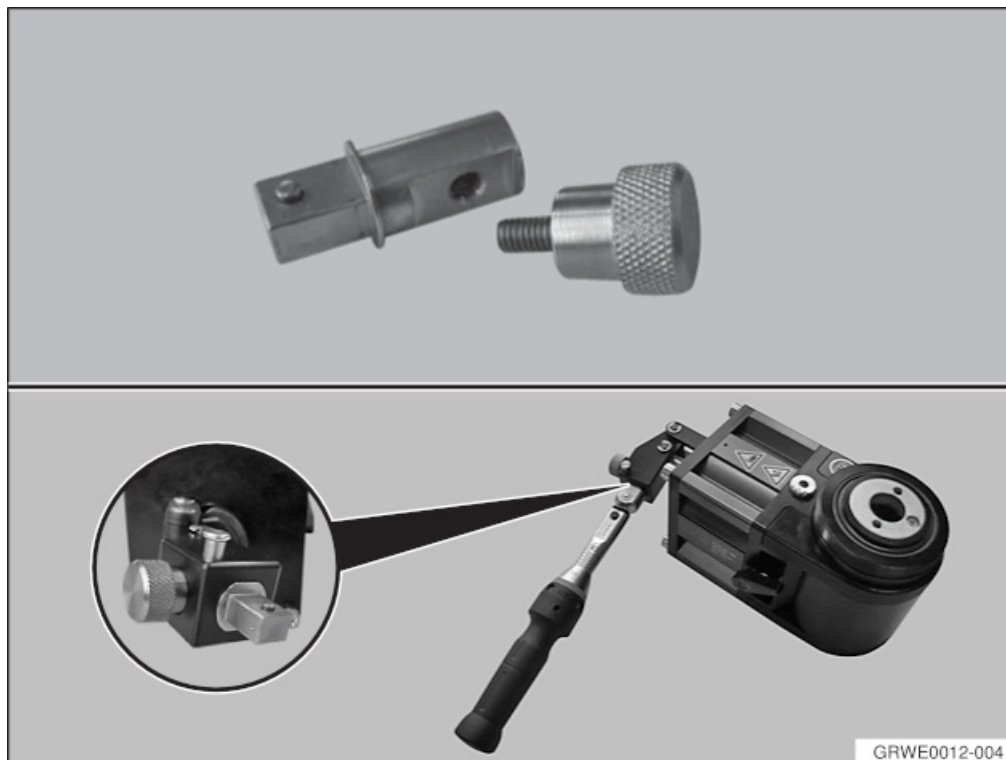


Required components for all models and types:

1	Hydraulic unit
E1	Holding sleeve M24
D1	Washer
F2	Spindle M24 / M20 (length 335 mm)

Components specific to model and type (thread diameter, output shaft):

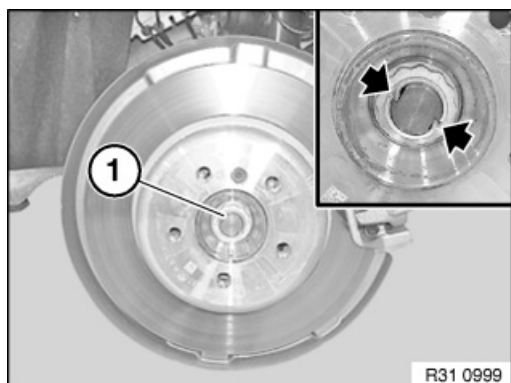
G4	Adapter M22 x 1.5 to M20
----	--------------------------



Important! Risk of damage!

The G4 special tool sleeve used has relatively thin walls due to its technical requirements. So that the load limits of the clamping sleeve are not exceeded when pulling in the output shaft, the adapter 81 64 2 318 661 must be used together with a torque wrench.

Fit adapter with torque wrench to hydraulic unit (see graphic).
Set torque wrench to 20 Nm.
Draw in output shaft with hydraulic tool until the torque wrench is activated.



Tighten collar nut (1), activate parking brake for this purpose.

Tightening torque 31 60 2AZ.

Installation note:

Renew collar nut (1), apply a light coating of oil to collar nut contact surface and tighten.

No oil permitted on thread of shaft journal or collar nut.

Secure collar nut (1) by positive peening at flat areas of output shaft.



**Special tools required:**

- 11 8 310
- 32 1 260
- 31 5 200

**Necessary preliminary tasks:**

- Remove output shaft.

**Important!**

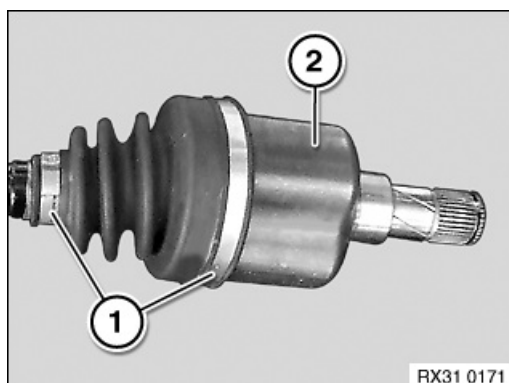
Repair should only be carried out via the inner joint! Do not press off or disassemble wheel-side joint.

The transmission-side joint may be bent by max. 18° and the wheel-side joint by max. 45°!

Remove all traces of old grease from inner joint, wipe out outer joint!

Only use dry, clean cloth free of grease and lint for cleaning!

Visible soiling of joints (e.g. by water or dirt) will cause premature failure!

**Important!**

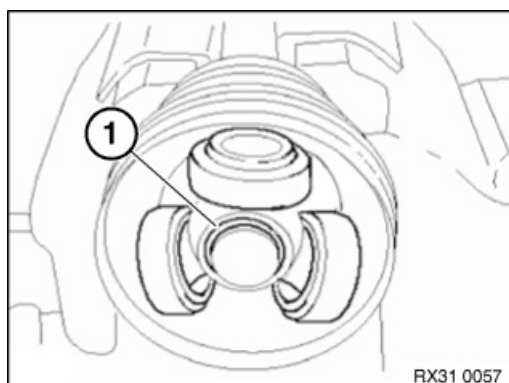
Always use plastic protective jaws when working with a vice.

Used tensioning strap must not be re-used!

Clean output shaft and grip in vice.

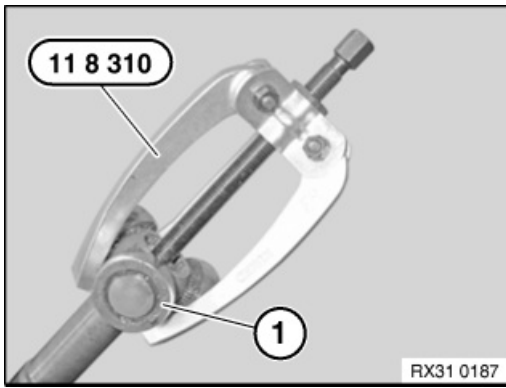
Release tensioning strap (1).

Detach housing (2) and clean carefully.

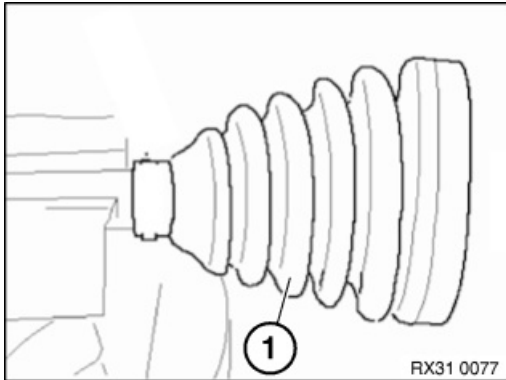


Remove circlip (1).





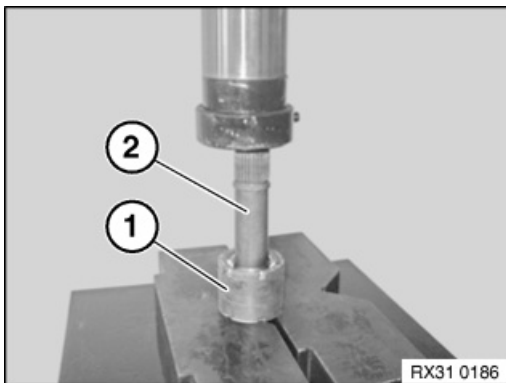
Pull tripod star (1) off output shaft with special tool 11 8 310 and clean carefully.



Important!

Remove all traces of old grease. Old gaiter must not be reused!

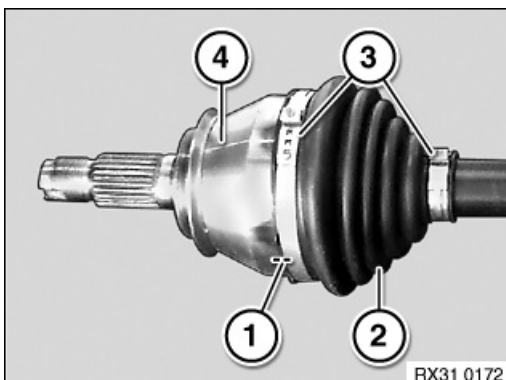
Detach gaiter (1) of joint on transmission side and carefully clean output shaft.



Press vibration absorber (1), if fitted, off output shaft (2) with press.

Vibration absorber must not be reused.

Replace vibration absorber -> Refer to subsequent procedure.



Removing outer joint gaiter:

Important!

The wheel-side constant velocity joint is pressed on and secured with a snap ring. Do not press off or disassemble!

Failure to comply with this instruction will result in damage to the constant velocity joint.

Mark axial position (1) of gaiter (2) to wheel-side joint (4).

Release clamping bands (3).

Detach gaiter (2) of joint on wheel side.

Wipe accessible areas of joint (4) with a clean and lint-free cloth.



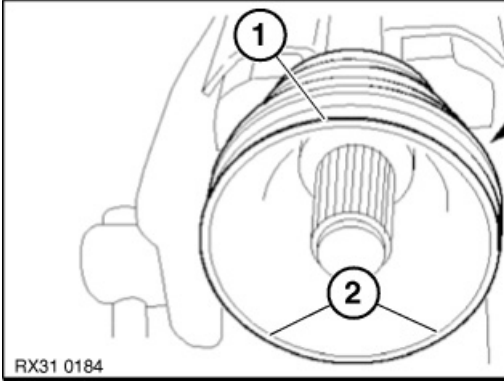


Installing outer joint gaiter: Important!

Use only quantity of grease provided.

The joint on the wheel side must not be packed with more than 120 g of grease.

During assembly, the sealing surfaces on the gaiter and joint must be clean, dry and free of grease!



Slide new gaiter (1) onto output shaft and fill with lubricating grease from repair kit.

Note:

The sealing surfaces (2) inside the gaiter and the groove on the constant velocity joint must be dry, clean and free of grease.

Push packed gaiter together with infinitely variable jubilee clip on to joint on wheel side.

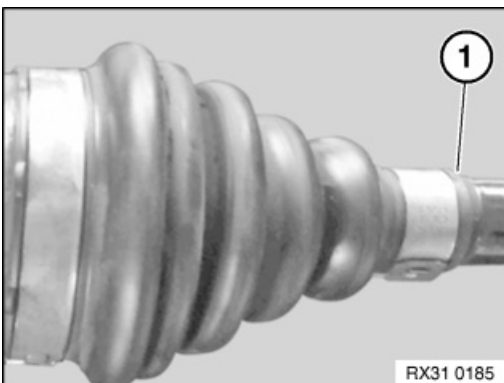
Ensure the gaiter snaps into the groove in the joint and is aligned with the axial marks.

Position a new infinitely variable jubilee clip in the groove for the gaiter and close with special tool 32 1 260 .

Due to the material thickness, an increased closing force is required!

Note:

The diameters of the stepless ear clips are marked on the components!

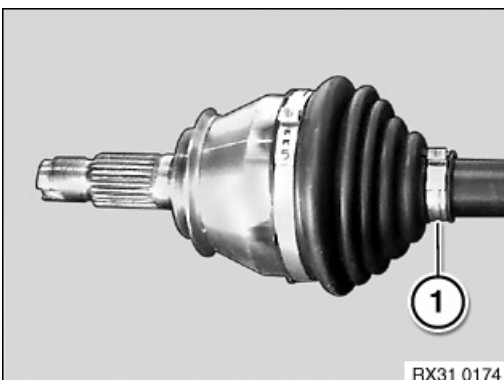


Important!

Gaiters must be bled after fitting in order to adapt the excess pressure generated during fitting to the ambient pressure!

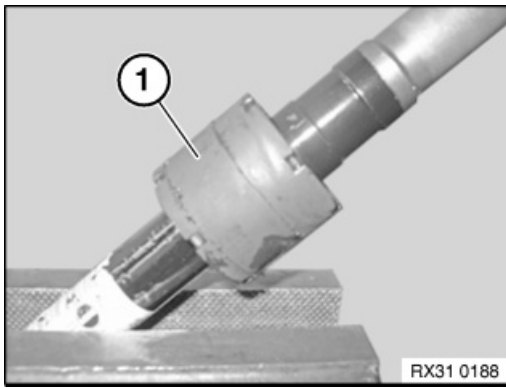
Slide gaiter up to visible groove (1).

Bleed gaiter; carefully slide a suitable tool between gaiter and output shaft for this purpose.



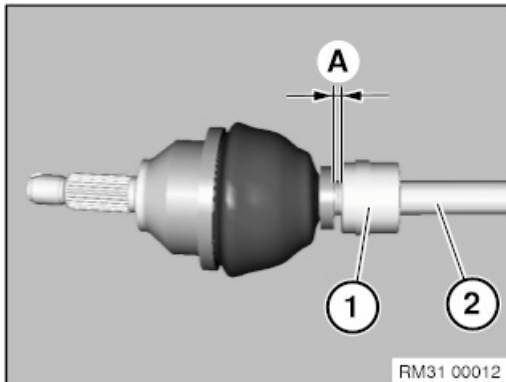
Close new infinitely variable jubilee clip (1) with special tool 32 1 260 .





Pressing on vibration absorber:

Grip output shaft in vice and push vibration absorber (1) by hand onto output shaft.



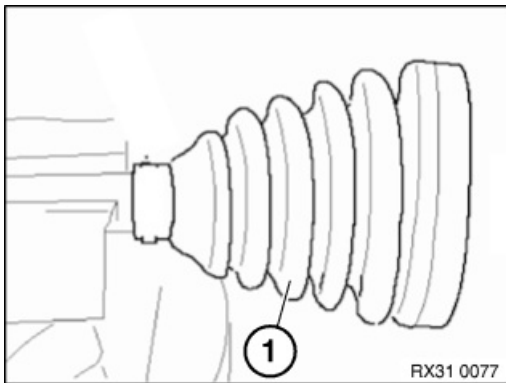
Ensure the gaiter snaps into the groove in the joint and is aligned with the axial marks.

Adjust vibration absorber (1) so it is positioned a distance (A) = 3 mm from the control groove.

Installation note:

The position of the vibration absorber must be precisely adhered to.

The control groove is still visible after the gaiter is mounted.

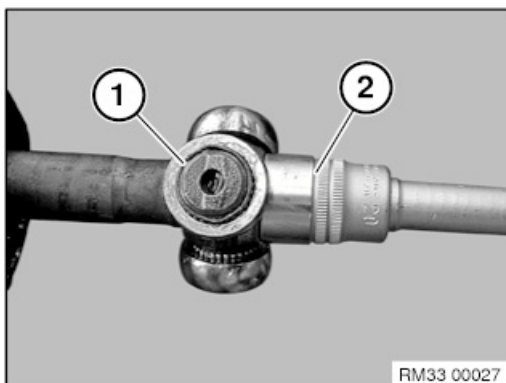


Installing inner joint gaiter:

Slide new gaiter (1) together with infinitely variable jubilee clip and retaining clip on to output shaft.

Installation note:

Push gaiter of joint on transmission side up to stop on vibration absorber.

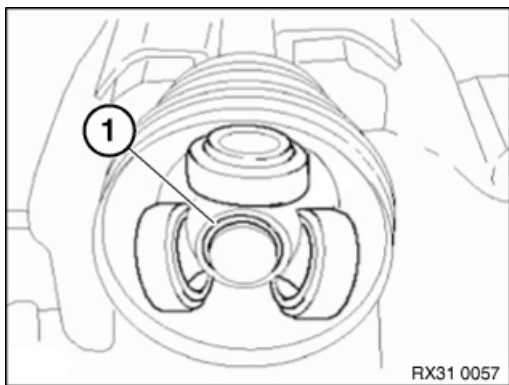


Important!

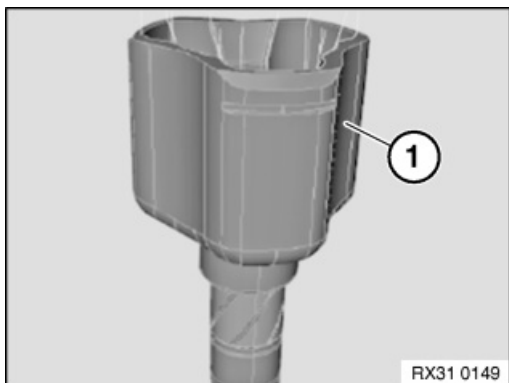
Align tripod star such that the bevels face towards the output shaft!

Drive tripod star (1) with a suitable tool (2) onto output shaft until groove for circlip is exposed.





Install circlip (1).

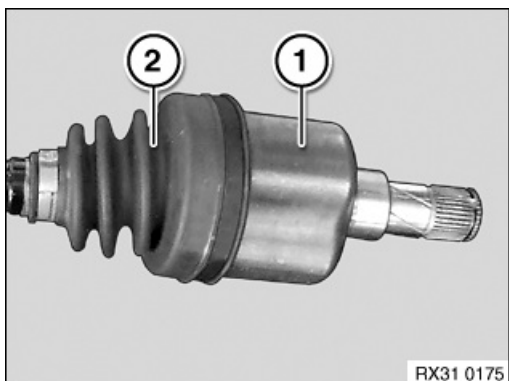


Important!

Use only quantity of grease provided.

Packing of grease in the transmission-side joint must not exceed 150 g.

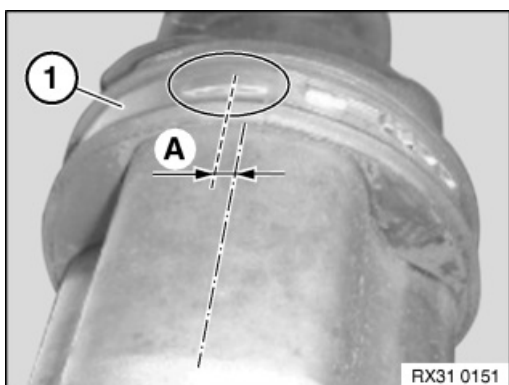
Pack lubricating grease into housing (1).



Important!

During assembly, the sealing surfaces on the gaiter and joint must be clean, dry and free of grease!

Attach packed housing (1) to tripod star and into gaiter (2). *Note:* Make sure gaiter is correctly seated in groove in housing.



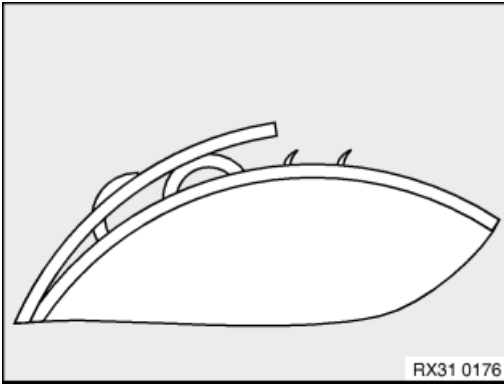
Important!

The centre point of clip must be level with the centre line of the housing!

Max. deviation (A) ± 10 mm

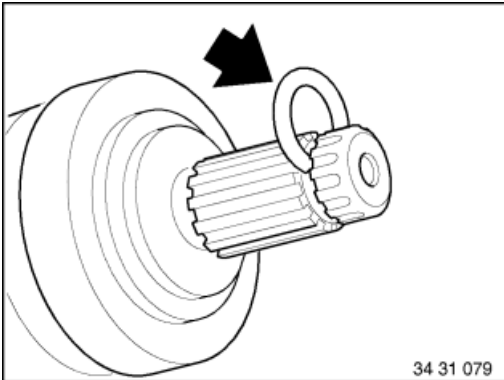
Close new infinitely variable retaining clip with special tool 31 5 200 .





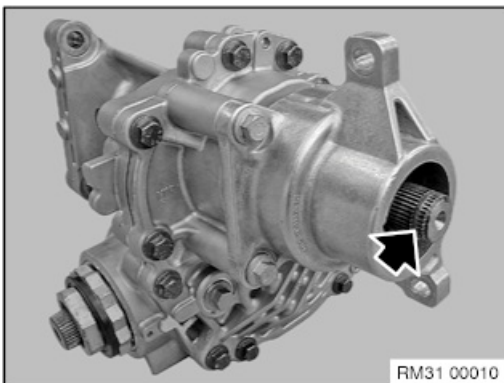
Important!

The stepless clamp must snap into place completely with both hooks! Both hooks must no longer be visible after engagement.



Important!

The circlip must be renewed!

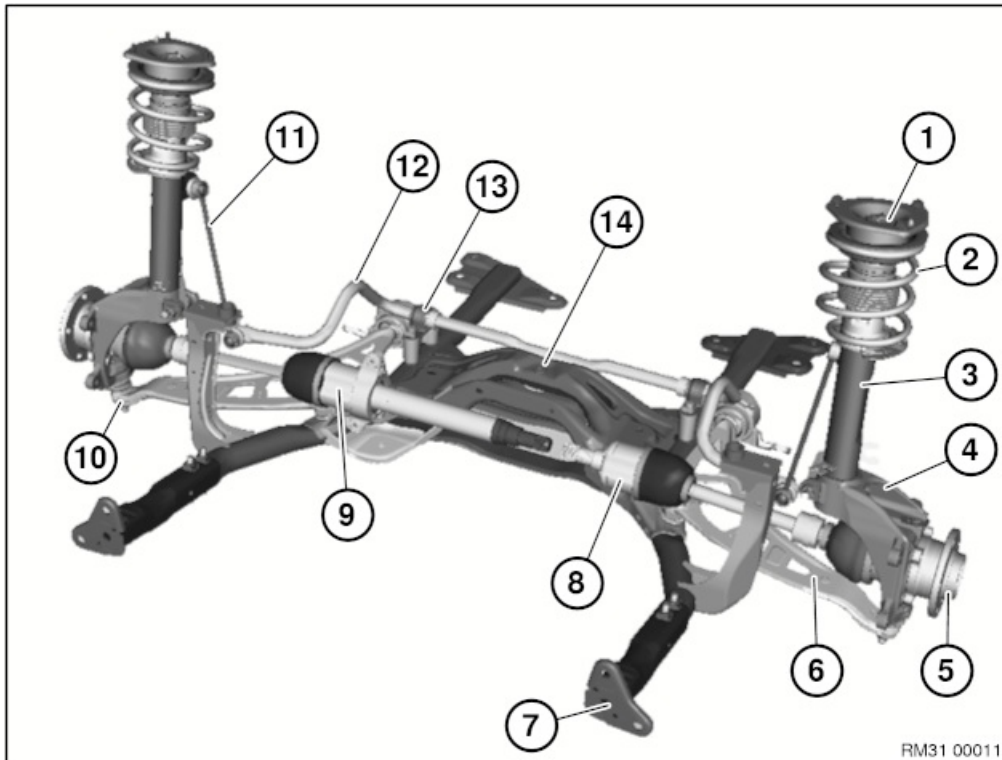


Important!

In all-wheel drive vehicle, circlip on transfer box must be renewed.



31 Front axle overview



Safety instructions & general information

- 1 Spring strut support bearing
- 2 Coil spring
- 3 Spring strut shock absorber .
- 4 Swivel bearing
- 5 Wheel bearing
- 6 Wishbone / bracket / rubber mount
- 7 Bumper bracket
- 8 Left output shaft
- 9 Right output shaft
- 10 Wheel guide joint
- 11 Anti-roll bar link
- 12 Anti-roll bar
- 13 Stabilizer rubber mount
- 14 Front axle support

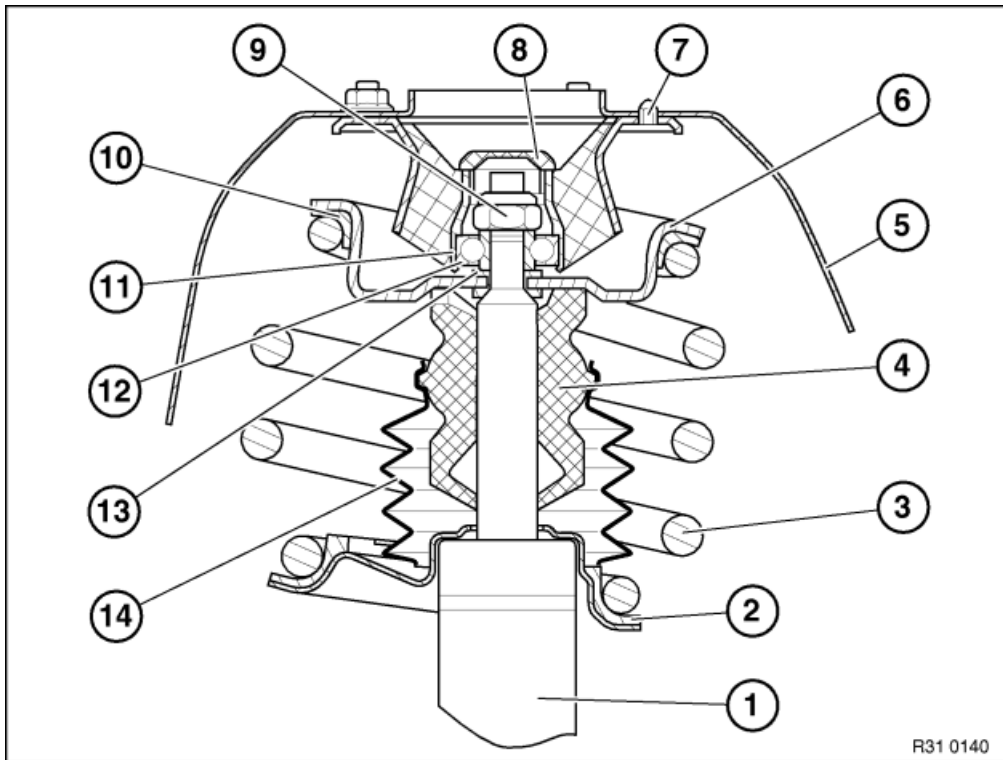
Adjusting procedure

Testing

Troubleshooting



31 Layout of spring strut shock absorber



- | | |
|-------------------------------|-----------------------|
| 1 Spring strut shock absorber | 10 Upper spring pad |
| 2 Lower spring pad | 11 Support bearing |
| 3 Coil spring | 12 Dust sleeve |
| 4 Auxiliary damper | 13 Thrust washer/shim |
| 5 Wheel arch | 14 Gaiter |
| 6 Upper spring plate | |
| 7 Centering pin | |
| 8 Cover cap | |
| 9 Nut | |





Screw securing adhesive is a means of preventing a screwed connection from being loosened by external influences.

Once the screw has been coated with adhesive, the adhesive remains inactive until such time that it is activated by the encapsulation breaking when the screw is inserted and then cures (hardens) at room temperature.



Installation note:

- Screw connection must be completed within 20 mins. (start of curing)
- Microencapsulated screws must not be retightened
- Thread of nut must be cleaned beforehand in event of repeated use



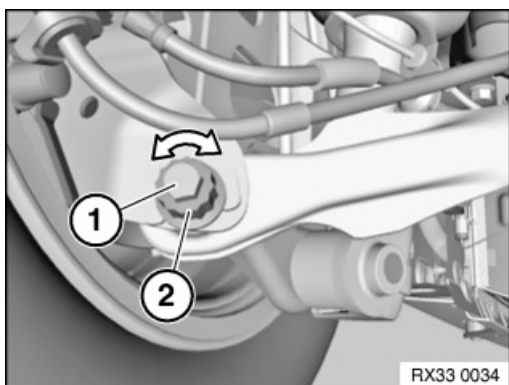
**Special tools required:**

- 32 4 200

*Note:*

A camber change always means a toe change as well. The camber must therefore be adjusted first.

If camber and toe-in are not adjustable within setpoint range:
Troubleshooting at rear axle.

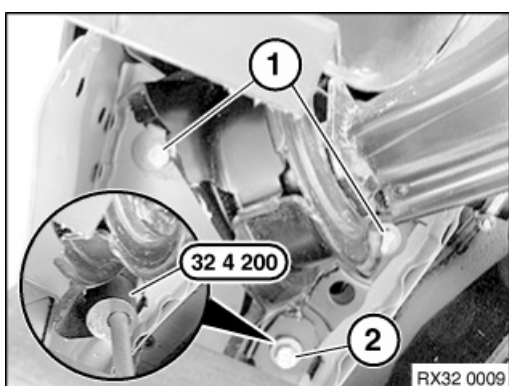
**Adjusting camber: Important!**

Observe following sequence:

- Lift the vehicle (wheels off the ground)
- Slacken the screw (1).
- Twist the camber on the eccentric disc (2) towards the positive maximum (wheel positioned at maximum angle to the centre of the vehicle at the bottom)
- Slightly tighten the screw (1)
- Lower and compress the vehicle
- Slacken the screw (1) and adjust the camber to the setpoint value by twisting the eccentric disc (2)
- Tighten down screw (1)

Installation note:

Tightening torque 33 32 2AZ.

**Adjusting toe:**

Slacken screws (1) and (2) about 1.5 turns on bearing support.

Mount special tool 32 4 200 on screw (2).

Turn special tool 32 4 200 and adjust toe-in to setpoint value.

Installation note:

Tightening torque 33 32 5AZ.



**Important!**

Changes in axle geometry caused by accidents must under no circumstances be rectified by a camber adjustment!

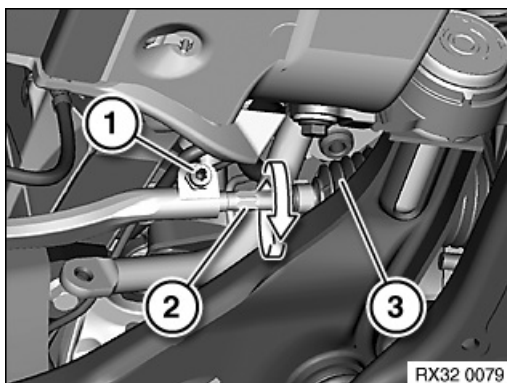
Note:

Camber and toe-in influence each other. Adjust the toe-in first in order to simplify the adjustment procedure.

The centring pin may only be removed if the camber is outside the specified tolerance after toe adjustment.

**Adjusting toe:**

Bring the steering wheel into the straight-ahead position and secure with steering wheel arrester.



Release screw (1).

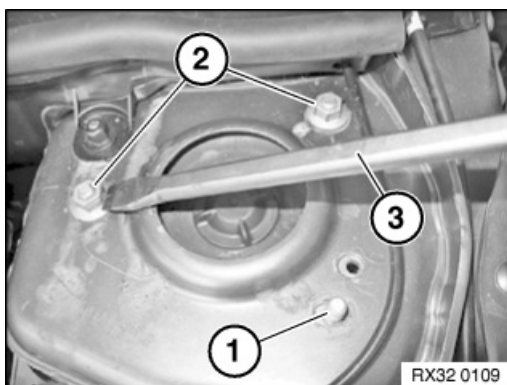
Set the toe to the setpoint value by turning the track rod on the hexagon head (2).

Installation note:

Make sure that the gaiter (3) of the track rod does not turn with it.

Installation note:

Tightening torque 32 21 2AZ.

**Adjusting camber:**

Slacken nut (1).

Slacken nuts (2).

Tightening torque 31 31 1AZ.

Important!

Check the stud bolts (1) in the elongated hole of the spring strut dome for clearance.

With a suitable tool, move the stud bolt or support bearing and adjust the camber.



32 00 150 Carry out Kinematics Diagnosis System wheel alignment with vehicle load up to design position



Attention!

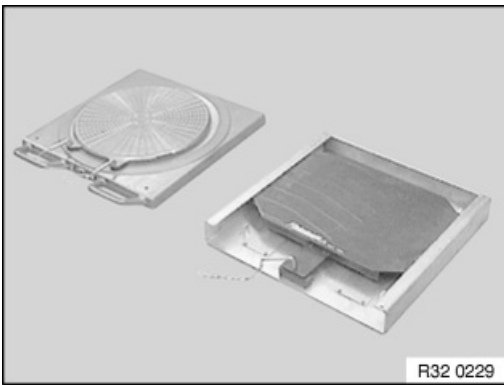
Perform wheel alignment only while vehicle is loaded:

- If the technical prerequisites for alignment with ride height input are not fulfilled
- If the vehicle in question is a damaged vehicle



Note:

- Read and comply with General information and definitions.
- Read and comply with General chassis definition.
- Update KDS versions
- Check compliance with test conditions, repair vehicle if necessary.



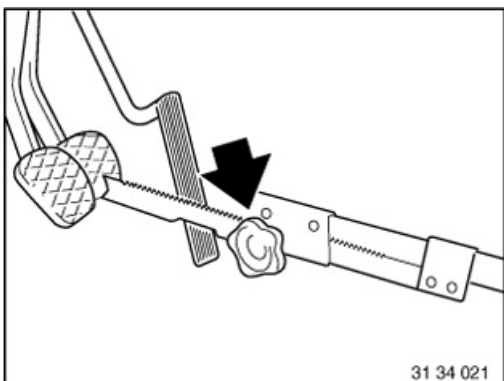
- If necessary, prepare vehicle hoist.
- Drive vehicle onto vehicle hoist.

Note: The front and rear wheels must be positioned centrally on the rotary and sliding plates.

Note: Rotary plates may vary from illustration depending on the manufacturer!



- Attach pickup/ride height marks to vehicle (observe specifications from the various equipment manufacturers).
- Enter customer and vehicle data
- Identify chassis version and select vehicle
- Enter tyre inflation pressure and tread depth
- Move vehicle into design position



- Install brake pedal tensioner





- Remove locking pins from both rotary and sliding plates.
- Perform input measurement in accordance with equipment manufacturer's instructions.
- If necessary, adjust front axle and rear axle
- Perform output measurement in accordance with equipment manufacturer's instructions.
- Save and print out test record.
- Insert locking pins into both rotary and sliding plates
- Remove chassis/wheel alignment system



Only in event of customer complaint (e.g. poor driving performance):

Attention!

Do not remove screws/bolts (front axle support to engine support or body)!

Slacken all screws/bolts (front axle support to engine support or body) and then retighten to specified torque.

See lower front axle support



*Note:*

Steering angle sensor adjustment must be carried out:

- after adjustment work on the front axle/steering
- after all mechanical work on the steering system
- after replacement / coding / programming of the following components:
 - Steering column switch cluster
 - Dynamic Stability Control (DSC) control unit



Connect vehicle to BMW diagnosis system.

Select and carry out steering angle sensor adjustment under Service functions.



00 Danger of injury if oil comes into contact with eyes and skin



Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin



Protective measures/rules of conduct:

- Wear safety goggles.
- Wear oil-resistant protective gloves.
- Observe country-specific safety regulations.



First aid measures:

- Eye contact: Immediately rinse out eyes with lots of water and for at least 15 minutes. In the case that it is available, use an eye wash bottle. If eye irritation persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

Note: Do not use solvents/thinners.



**Danger of poisoning!**

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

**Protective measures/rules of conduct:**

- Fill oil in appropriately marked containers only.
- Do not pour oil in drinking vessels (beverage bottles, glasses or cups).
- Observe country-specific safety regulations.

**First aid measures:**

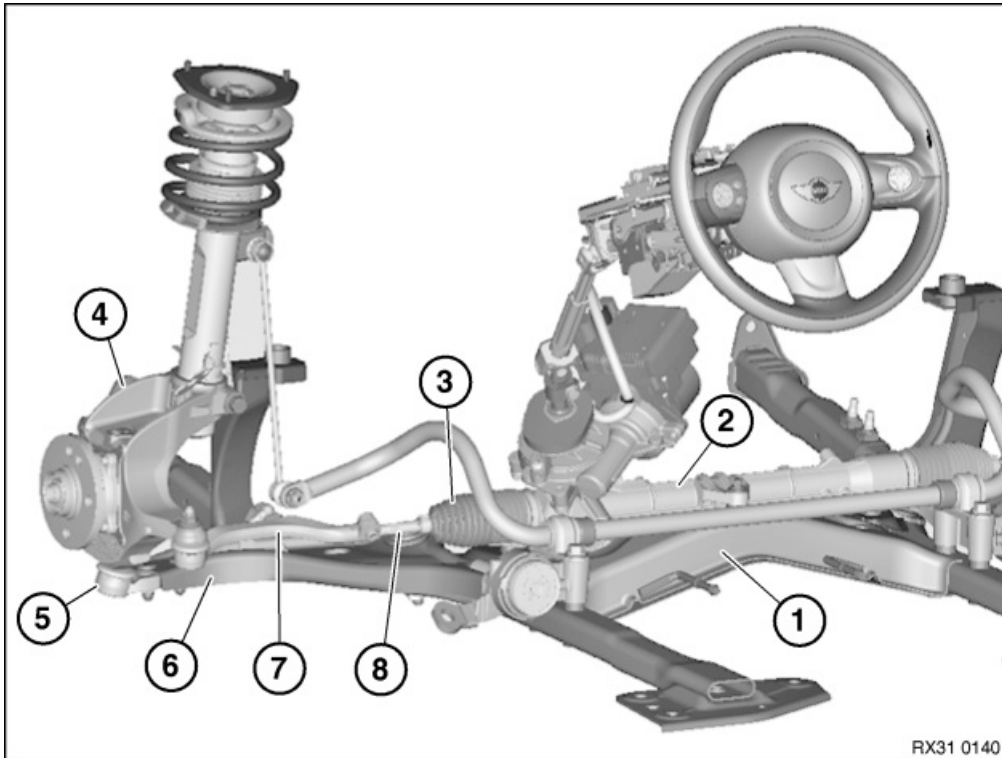
- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.



31 00 ... Front axle + steering: wheel alignment check must be carried out after the following work



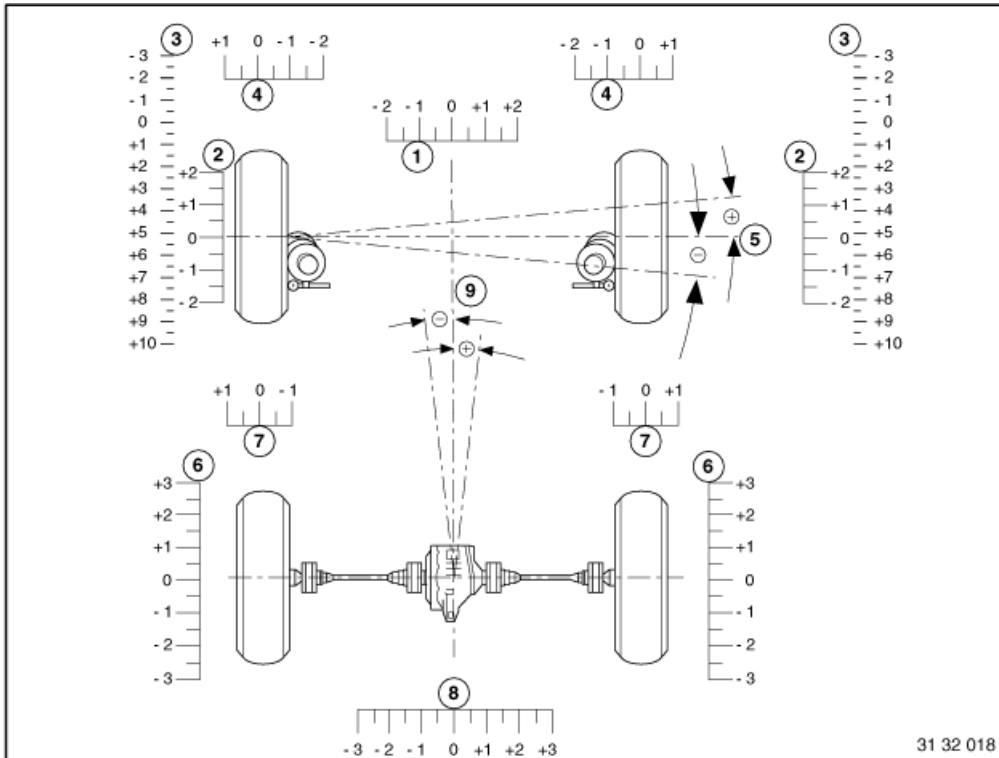
A wheel alignment check must be carried out after the following work:

- Release of following screw connections:
 - Steering box to front axle support
 - Wheel control joint to swivel bearing
 - Track rod end to track rod
 - Support bearing on body (when centering is not available)

- Replacement of following parts:
 1. Front axle support
 2. Steering box
 3. Gaiter (if the tie rod end has to be screwed off)
 4. Swivel bearing
 5. Wheel guide joint
 6. Wishbone
 7. Track rod end
 8. Track rod



32 00 ... General chassis and suspension definitions

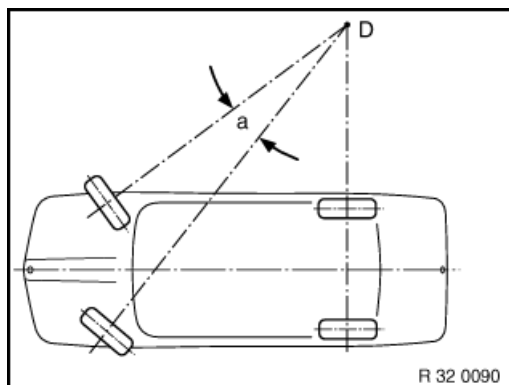


31 32 018

- | | |
|---|-----------------------------|
| 1. Toe | 5. Wheel misalignment |
| 2. Camber | 6. Camber |
| 3. Caster (with 10° or 20° wheel lock) | 7. Rear-wheel position |
| 4. Toe angle difference (with 20° wheel lock) | 8. Toe |
| | 9. Geometrical driving axis |



32 00 ... General information and definitions



Toe angle difference

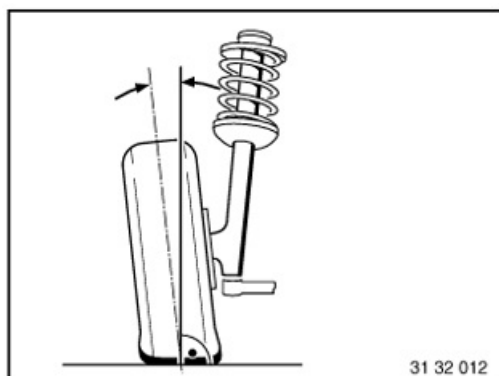
a Toe difference angle

D Centre point of operating circle

The toe angle difference is the angle adjustment of the inner cornering wheel relative to the outer cornering wheel when negotiating a curve. Steering is designed in such a way that angular position of wheels changes as steering lock progresses.

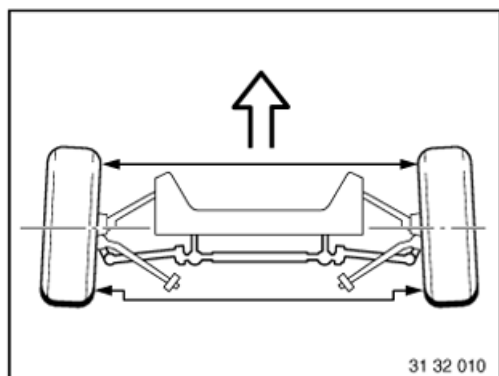
A correctly adjusted toe angle difference produces equal values for left and right lock with consideration of factory tolerances.

Toe angle difference provides information on corresponding operation of steering trapezoid for left or right steering lock from centre position.



Camber

Inclination of the wheel from the perpendicular.

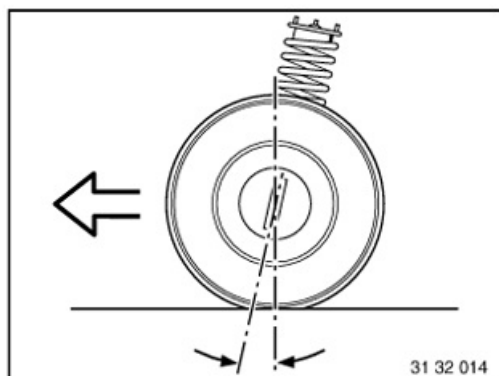


Toe

Reduction in distance of front of front wheels to rear of front wheels. The toe-in prevents the wheels from moving apart during driving and thus:

- the wheels from vibrating and grinding
- excessive tire wear
- excessive strain on the steering linkage and its links/joints
- heavy vehicle steering

Measurement is performed in "straight-ahead mode".

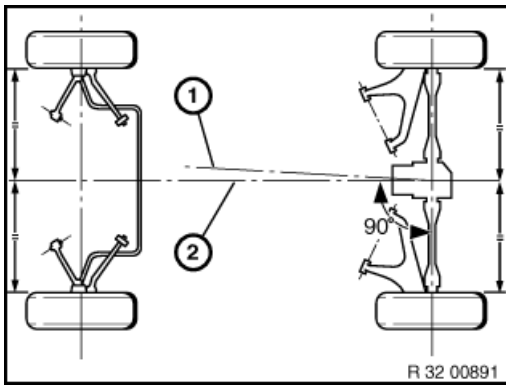


Castor

Is the inclination of the kingpin in the direction of travel viewed from the side. The line through the centre point of the spring strut support bearing and the control arm ball joint corresponds to the "kingpin".

Thanks to caster, wheels are pulled and not pushed. In a similar manner to king pin inclination, when driving in curves or around corners, returning forces are reproduced to help return wheels to straight-ahead position.





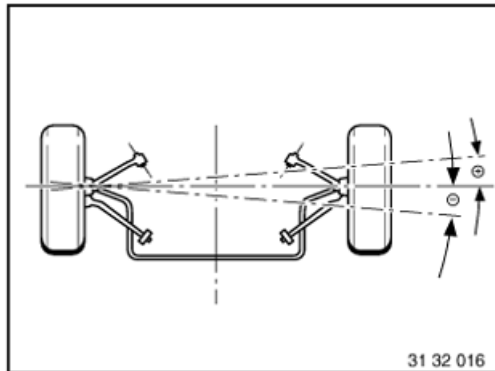
Geometrical driving axis 1

Is the angle bisector from the total rear-wheel toe.

Front-wheel measurements are taken in reference to this axis.

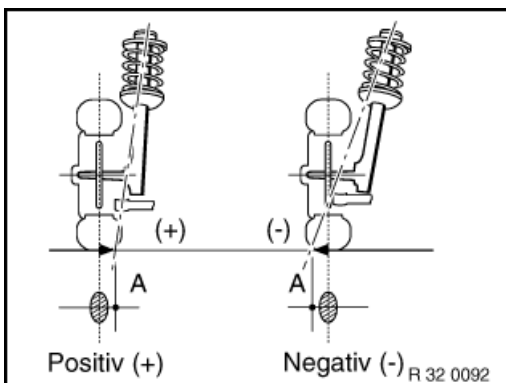
Symmetrical axis 2

Centre line running through front and rear axles.



Wheel misalignment

Angle by which one front wheel is displaced more towards front or rear than the other front wheel. The wheel offset angle is positive when the right wheel is displaced towards the front and negative when it is displaced towards the rear.



Kingpin offset/scrub radius

Is the distance from the centre of the wheel contact face to the intersection point of the kingpin extension. The line through the centre point of the spring strut support bearing and the control arm ball joint corresponds to the "kingpin".

The scrub radius is influenced by camber, kingpin angle and wheel offset of the wheel rim.



*Note:*

If the front spring strut does not have a label for suspension identification, the type of suspension can be identified from the part number in the Electronic Parts Catalogue.



32 00 ... KDS data statuses

Nominal values for wheel alignment are not published in ISTA.

The current setpoint values are made available in the workshop equipment portal.

See:

- www.bmwgroup-wep.com
 - Workshop Equipment catalogue:
 - Select Wheel alignment
 - Select KDS nominal values
 - E.g. Select Beissbarth KDS update, Copy data

Or:

- Aftersales Assistance Portal (ASAP)
 - Profile: Select Service/Technology
 - Select Workshop equipment
 - Select Start BMW
 - Select Workshop equipment catalogue
 - Select Wheel alignment
 - Select KDS nominal values
 - E.g. Select Beissbarth KDS update, Copy data

We recommend that the data records are updated on a regular basis.

Please contact your subsidiary if you do not have access to the portals listed.



32 00 155 Kinematics Diagnosis System wheel alignment with ride height measurement without loading the vehicle



Attention!

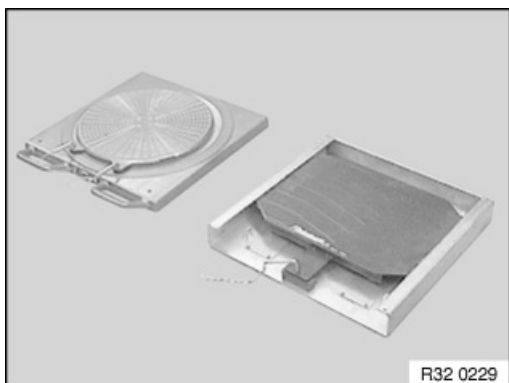
Do not perform wheel alignment without loading the vehicle:

- If the technical prerequisites for alignment with ride height input are not fulfilled
- If the vehicle in question is a damaged vehicle



Note:

- Read and comply with General information and definitions.
- Read and comply with General chassis definition.
- Update KDS data states
- Check compliance with test conditions, repair vehicle if necessary.



- If necessary, prepare vehicle hoist.
- Drive vehicle onto vehicle hoist.

Note: The front and rear wheels must be positioned centrally on the rotary and sliding plates.

Note: Rotary plates may vary from illustration depending on the manufacturer!



Note:

Vehicles with active steering:

Start up active steering prior to wheel alignment!

On vehicles with rear axle slip angle control:

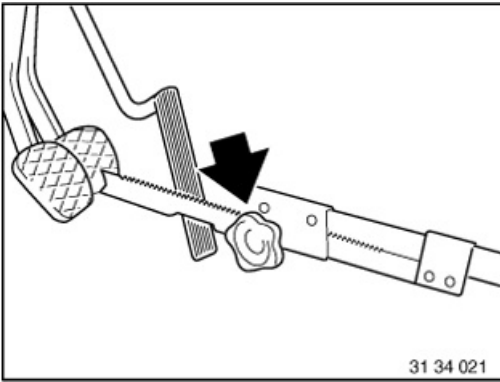
The service function "Moving HSR actuator to the centre position" is included in the active steering start-up.



- Attach pickup/ride height marks to vehicle (observe specifications from the various equipment manufacturers).
- Enter customer and vehicle data
- Identify chassis version and select vehicle
- Enter tyre inflation pressure and tread depth
- Measure vehicle ride height using a tape measure and input the result (Beissbarth KDS II wheel alignment equipment only)

If the ride height is outside the tolerance range (+40/-20 mm), load or unload vehicle accordingly to adjust the vehicle in this ride-height window





- Install brake pedal tensioner



- Remove locking pins from both rotating and sliding plates
- Perform input measurement in accordance with equipment manufacturer's instructions.
- If necessary, adjust front axle and rear axle
- Perform output measurement in accordance with equipment manufacturer's instructions.
- Save and print out test record.
- Insert locking pins into both rotary and sliding plates
- Remove chassis/wheel alignment system



Only in event of customer complaint (e.g. poor driving performance):

Attention!

Do not remove screws/bolts (front axle support to engine support or body)!

Slacken all screws/bolts (front axle support to engine support or body) and then retighten to specified torque.

Refer to Lowering front axle support.



**Necessary preliminary tasks:**

- Move vehicle into normal position



- Add/distribute weights in area of spring struts until the vehicle ride height is within the tolerance (refer to Technical Data).
Measure vehicle ride height



**Necessary preliminary tasks:**

- Check compliance with test conditions, repair vehicle if necessary.



- Check vehicle interior and luggage compartment (incl. spare wheel well) for load, unload vehicle if necessary
- Introduce DIN load (refer to Technical Data) into vehicle
- Determine vehicle ride height

Note: If the vehicle ride height is not inside the tolerance (refer to Technical Data), the vehicle must be repaired (coil spring/leakage).



32 00 ... Notes and specifications for the replacement of the steering gear, steering column and the steering shaft following accident damage

Situation:

In the event of accidents or driving conditions similar to accidents, shock-like loads can cause different types of damage to steering boxes. When a steering box is externally undamaged, it is sometimes only possible to identify damage with great difficulty and with great effort. However, damage of this nature poses an unacceptable risk to the vehicle because it can result in failure of the steering system.

Because of the disproportionate amount of effort involved, it is generally not sensible to check thoroughly all the individual components of the steering box and as an alternative it is necessary to take into account other components which can be checked more easily.

Procedure:

The steering box must be replaced if one or more of the following points apply:

- A. Visible or noticeable damage to the steering box
 - Version with electric steering box (EPS): Examine in particular the control unit with all plug connections for damage and hairline cracks.
- B. Unacceptable torque increase and jamming when the steering box is turned from lock to lock (without hydraulic/electrical assistance)
- C. Fire damage
- D. Damage, permanent deformation or fractures to:
 - Wheel rims in the event of a negative result from the wheel alignment check
 - Spring struts, steering stubs, wheel carriers
 - Wishbones
 - Struts or trailing links or anti-roll bar with this function
 - Body-side attachment points for wheel guide/control components
 - Front axle support
 - Pitman arms
 - Track rods
 - Steering box fixtures
 - Steering column

A lopsided steering wheel, significant deviations of camber/track values and noises when cranking the steering can be additional indications for the damage/deformations listed here.

This guideline is binding for all accident repairs to BMW and MINI vehicles.

Note:

If the steering box replacement work which is required for safety reasons is refused by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

For a corresponding example of the memorandum, see Service Information (bulletin) 320188(828) Appendix 1.

Actual situation of the steering column and steering shaft:

In the event of accidents or driving conditions similar to accidents, shock-like loads can cause different types of damage to the steering shaft and steering column. In case no external damage of the steering column and the steering shaft can be noticed, it is sometimes only possible to identify damage with great difficulty and with great effort.

Procedure for steering column and steering shaft:

The steering column and steering shaft must be replaced if one or more of the following points apply:

- Visible or noticeable damage, deformation or breakage of the steering column or steering shaft
- Damage, permanent deformation or breakage of the track rod



- Unacceptable torque increase and jamming when the steering column is cranked from limit position to limit position (without hydraulic/electrical assistance)
- If the wheel alignment nominal data cannot be reached after all the damaged wheel components are changed (exceedance of the permissible wheel alignment tolerances). If required, attach the measurement protocol of the invoice/certificate
- Positive check for activated crash system of the steering column:
- If no damage is visible on the steering column, the mechanical steering column must be checked for an activated crash system:
 1. Open ELV
 2. Pull steering wheel out towards the driver (towards the body) until the physical limit position is reached, but do not use excessive force
 3. Push steering wheel towards engine compartment (approx. 20-30 mm away from body) into the comfort position and lock

If no end stop is present when pulling out the steering column or the gaiter of the steering column shroud has tension, the crash system has activated and the steering column is to be renewed.

Note:

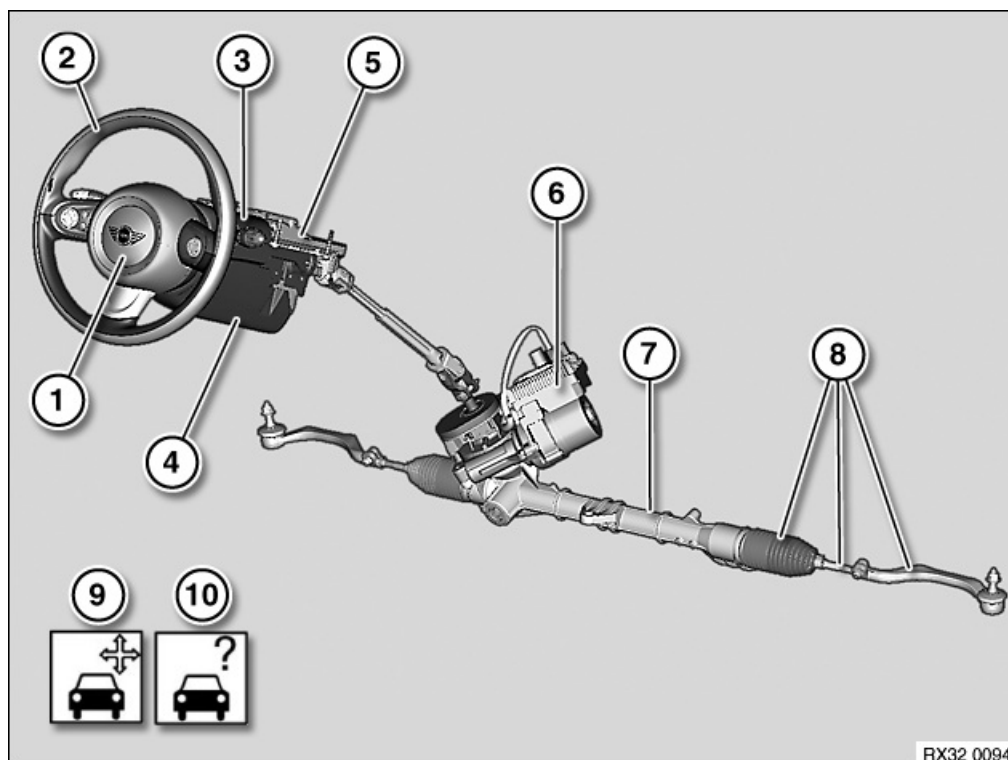
If the steering column/steering shaft replacement work which is required for safety reasons is rejected by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

For corresponding specimen of the memorandum, refer to Service Information 320188(828) Appendix 1

Attention!

The vehicle's operating licence will be invalidated whenever the function of any of its safety components is compromised!





Safety instructions and general information

1 Airbag unit	7	Steering gear (EPS)
2 Steering wheel	8	Track rod end, track rod, gaiter
3 Upper steering column casing	9	Adjustment work
4 Lower steering column casing	10	Troubleshooting
5 Steering column		
6 Electric motor with control unit		Version with Dynamic Stability Control (DSC): Carry out steering angle sensor adjustment



*Note:*

Rim runout compensation involves electronically recording the lateral runout of the rim and the possible clamping error of the quick-clamping unit for one wheel rotation and compensating the toe and camber for measurement/alignment.

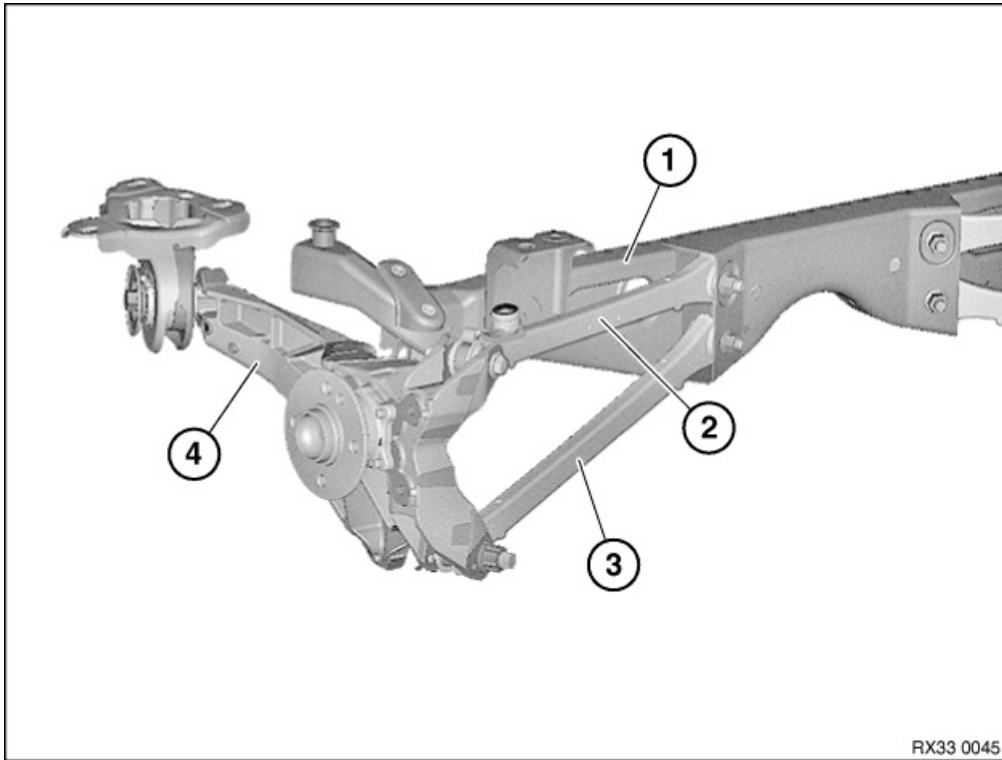
Raise body.

Perform rim runout compensation in accordance with equipment manufacturer's instructions.

Compress/deflect car.



33 00 ... Rear axle: perform wheel alignment after the following repair work



Perform wheel alignment after the following repair work:

- Release the following screw connection:
 - Trailing arm holder to body
 - Upper wishbone to rear axle carrier
 - Bottom wishbone at the rear axle support/trailing arm
- Replacement of following parts:
 1. Rear axle support
 2. Upper wishbone
 3. Lower wishbone
 4. Trailing arm/trailing arm holder/rubber mount



00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



Warning!

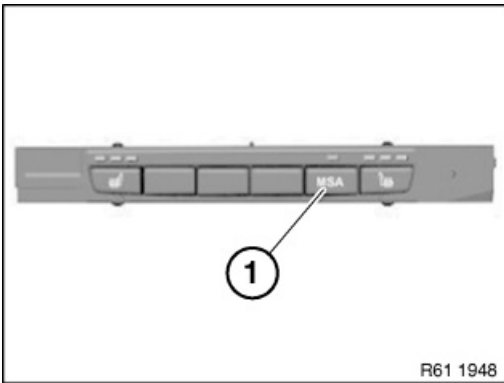
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

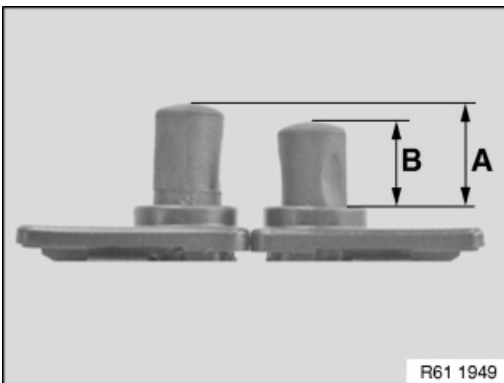
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode
 $A = 10 \text{ mm}$
 - Basic setting (engine hood/bonnet open)
 $B = 7 \text{ mm}$

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



When working with diagnosis tools:

- Observe instructions in diagnosis tool





Note:

For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) Service Information (bulletin) 61 01 07 335
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) Service Information (bulletin) 61 01 10 629



**Warning!**

Danger of poisoning if oil is ingested/absorbed through the skin!

Risk of injury if oil comes into contact with eyes and skin!

**Recycling:**

Observe country-specific waste disposal regulations.

**Measures if oil is unintentionally released:**

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

Note: Do not flush oil away with water or aqueous cleaning agents.



32 00 ... Test conditions for chassis/wheel alignment check

Observe the following test conditions prior to the chassis/wheel alignment check:

1. Only BMW approved wheel and tyre combinations are installed on the vehicle.
2. Correct tread depth. The tread depth for each axle may differ from left to right by max. 1-2 mm.
3. Correct tyre pressure (see label on vehicle).
4. All chassis and suspension components must be technically OK.
5. Condition of suspension and shock absorbers OK: Visually inspect for breakage, etc.



32 11 ... Instructions for removing and installing ear clips



Special tools required:

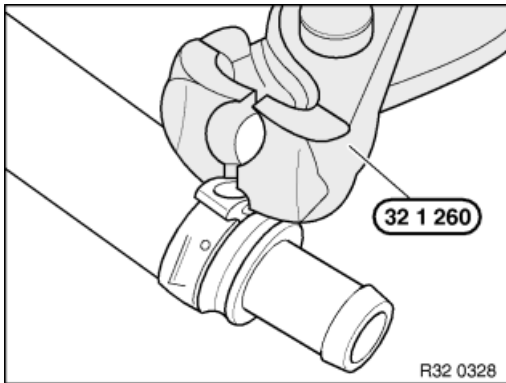
- 32 1 260



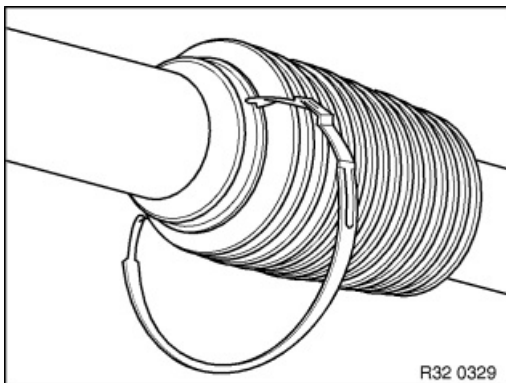
Note:

The work steps are show on assorted components.

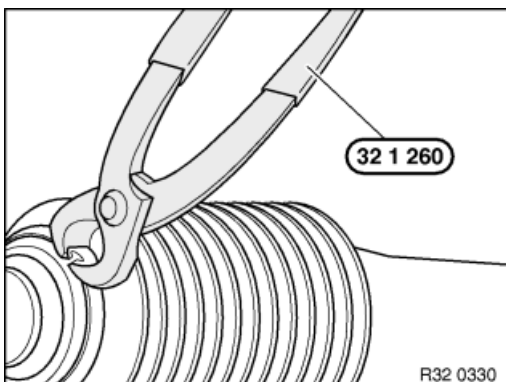
Ear clip must always be replaced.



To remove an ear clip, place special tool 32 1 260 at right angles to ear and cut ear open.

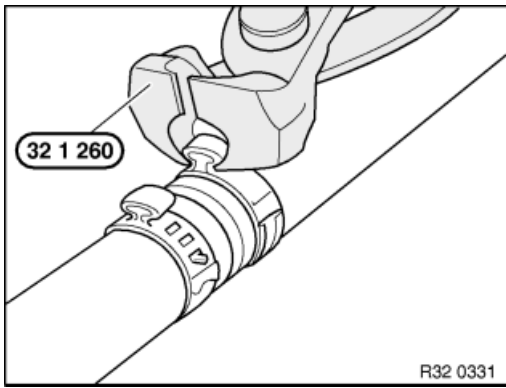


The ear clip can be fitted not only axially but also radially after the hook fastener has been opened.

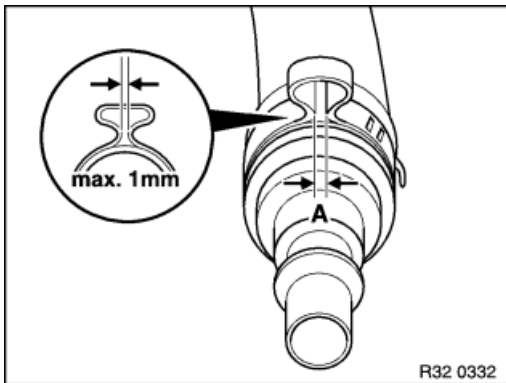


Attach hook fastener and press ear together with special tool 32 1 260 .





Side cutter of special tool 32 1 260 can be used in areas which are difficult to access.



Important!
Gap (A) max. 1 mm!



32 00 ... Notes and specifications for the replacement of the steering gear, steering column and the steering shaft following accident damage

Situation:

In the event of accidents or driving conditions similar to accidents, shock-like loads can cause different types of damage to steering boxes. When a steering box is externally undamaged, it is sometimes only possible to identify damage with great difficulty and with great effort. However, damage of this nature poses an unacceptable risk to the vehicle because it can result in failure of the steering system.

Because of the disproportionate amount of effort involved, it is generally not sensible to check thoroughly all the individual components of the steering box and as an alternative it is necessary to take into account other components which can be checked more easily.

Procedure:

The steering box must be replaced if one or more of the following points apply:

- A. Visible or noticeable damage to the steering box
 - Version with electric steering box (EPS): Examine in particular the control unit with all plug connections for damage and hairline cracks.
- B. Unacceptable torque increase and jamming when the steering box is turned from lock to lock (without hydraulic/electrical assistance)
- C. Fire damage
- D. Damage, permanent deformation or fractures to:
 - Wheel rims in the event of a negative result from the wheel alignment check
 - Spring struts, steering stubs, wheel carriers
 - Wishbones
 - Struts or trailing links or anti-roll bar with this function
 - Body-side attachment points for wheel guide/control components
 - Front axle support
 - Pitman arms
 - Track rods
 - Steering box fixtures
 - Steering column

A lopsided steering wheel, significant deviations of camber/track values and noises when cranking the steering can be additional indications for the damage/deformations listed here.

This guideline is binding for all accident repairs to BMW and MINI vehicles.

Note:

If the steering box replacement work which is required for safety reasons is refused by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

For a corresponding example of the memorandum, see Service Information (bulletin) 320188(828) Appendix 1.

Actual situation of the steering column and steering shaft:

In the event of accidents or driving conditions similar to accidents, shock-like loads can cause different types of damage to the steering shaft and steering column. In case no external damage of the steering column and the steering shaft can be noticed, it is sometimes only possible to identify damage with great difficulty and with great effort.

Procedure for steering column and steering shaft:

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- Visible or noticeable damage, deformation or breakage of the steering column or steering shaft
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- Unacceptable torque increase and jamming when the steering column is cranked from limit position to limit position (without hydraulic/electrical assistance)
- If the wheel alignment nominal data cannot be reached after all the damaged wheel components are changed (exceedance of the permissible wheel alignment tolerances). If required, attach the measurement protocol of the invoice/certificate
- Positive check for activated crash system of the steering column:
- If no damage is visible on the steering column, the mechanical steering column must be checked for an activated crash system:
 1. Open ELV
 2. Pull steering wheel out towards the driver (towards the body) until the physical limit position is reached, but do not use excessive force
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If no end stop is present when pulling out the steering column or the gaiter of the steering column shroud has tension, the crash system has activated and the steering column is to be renewed.

Note:

If the steering column/steering shaft replacement work which is required for safety reasons is rejected by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

For corresponding specimen of the memorandum, refer to Service Information 320188(828) Appendix 1

Attention!

The vehicle's operating licence will be invalidated whenever the function of any of its safety components is compromised!



**Special tools required:**

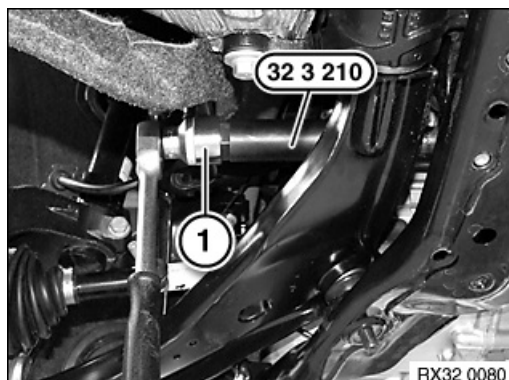
- 32 3 210

**Important!**

The steering box must be replaced if the polished surface of the rack is damaged (e.g. by corrosion)!

**Necessary preliminary tasks:**

- Remove track rod end from swivel bearing
- Remove gaiter from steering box and slide back

**Important!**

To avoid damage to rack and to suspension mounting, move rack in as far as possible.

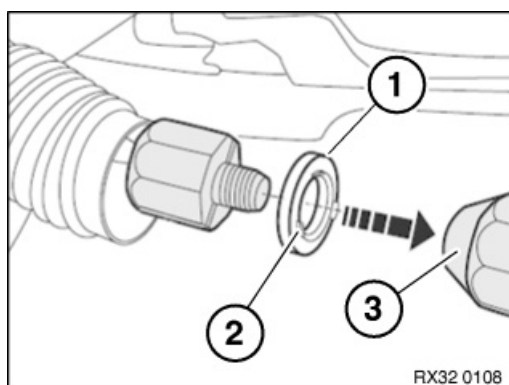
Release joint with special tool 32 3 210 and socket SW32 (1) on steering box rack. *Installation note:*

Clean rack.

Check surface of rack for damage (e.g. corrosion).

Grease toothed area of rack (refer to BMW Service Operating Fluids).

Tightening torque 32 21 3AZ.

**Replacement:****Important!**

On vehicles with 18" tyres and/or vehicles with Sport brake, if applicable, it will be necessary to install steering stop limiters to be ordered separately!

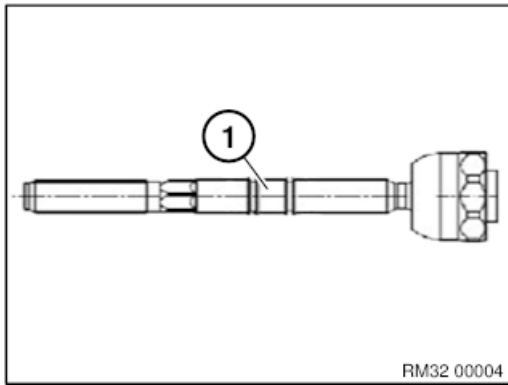
Slide both steering stop limiters (1) onto steering linkage.

Installation note:

Deformation elements (2) must point to steering box (3).

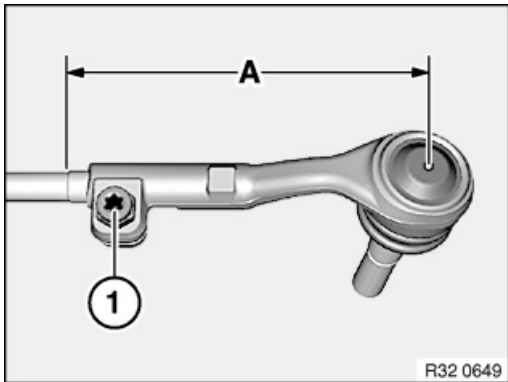
Tightening torque 32 21 3AZ.





On replacement, assemble new part with gaiter.

Grease track rod at the fit of the gaiter (1) with grease "FB-1 part number 2 208 093".



- Determine dimension (A) to simplify following adjustment of front axle

Installation note:

Slacken clamping bolt (1) and screw off track rod end.

Slide gaiter with ear clip and band clamp on track rod.

Screw in track rod end to dimension (A).

Tightening torque 32 21 2AZ.



After installation:

- Only if replacing/removing track rod end: Perform chassis / wheel alignment check

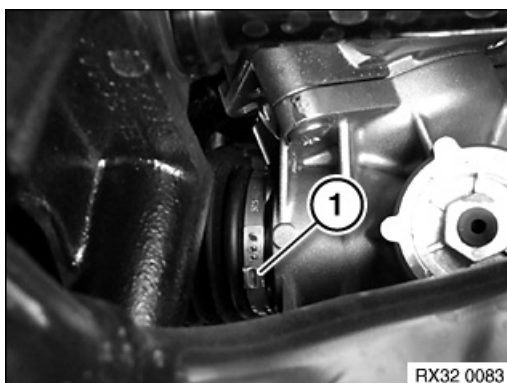


**Important!**

The steering box must be replaced if the polished surface of the rack is damaged (e.g. corrosion)!

**Necessary preliminary tasks:**

- Remove track rod end



Clean track rod.

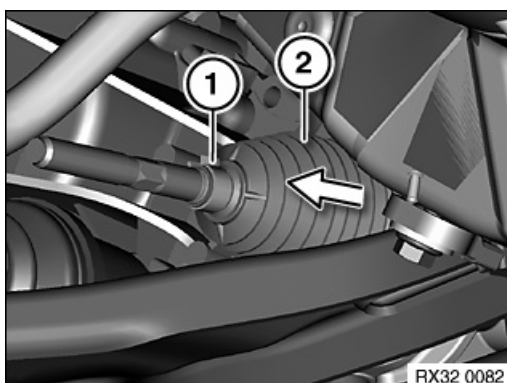
Release ear clip (1).

Installation note:

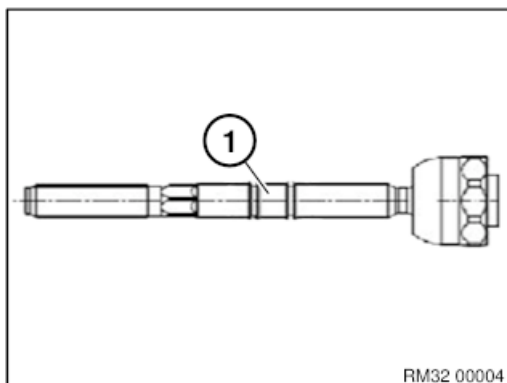
Clean rack and check surface for damage (e.g. by corrosion).

Grease rack (refer to Service Operating Fluids).

Release ear clip (1).



Release band clamp (1) and detach gaiter (2) from track rod.

*Installation note:*

Clean track rod and apply grease to taper.

Grease track rod at the fit of the gaiter (1) with grease "FB-1, part number 2 208 093". *Note:*

This ensures that the gaiter is not rotated when the track rod is rotated.





After installation:

- Perform wheel alignment check



**Special tools required:**

- 32 3 090

**Note:**

If the track rod end to track rod screw connection is released, it is necessary after reinstallation to carry out a wheel alignment check.

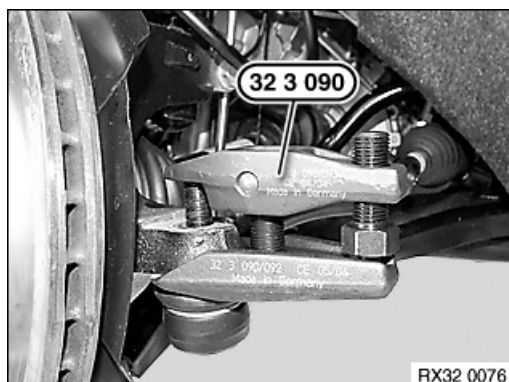
**Necessary preliminary work:**

- Remove front wheel

**Important!**

Do not release track rod end from swivel bearing with impact tool.

Rubber boot of track rod end must not be damaged!



Unfasten nut.

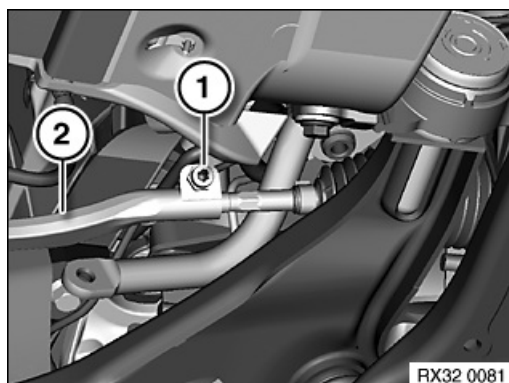
Press track rod end out of swivel bearing with special tool 32 3 090 .

Installation note:

Keep track rod end to swivel bearing connection clean and free from oil and grease.

Replace self-locking nuts.

Tightening torque 32 21 1AZ.



Mark thread depth of track rod end to simplify subsequent adjustment of front axle.

Release screw (1).

Screw off track rod end (2); if necessary, grip tie rod with open-end wrench.

Installation note:

Check gaiter for damage, replace if necessary.

Screw track rod end onto tie rod up to marking.

Tightening torque 32 21 2AZ.

**After installation:**

- Perform wheel alignment check





32 00 ... Notes and specifications for the replacement of the steering gear, steering column and the steering shaft following accident damage

Situation:

In the event of accidents or driving conditions similar to accidents, shock-like loads can cause different types of damage to steering boxes. When a steering box is externally undamaged, it is sometimes only possible to identify damage with great difficulty and with great effort. However, damage of this nature poses an unacceptable risk to the vehicle because it can result in failure of the steering system.

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 - Pitman arms
 - Track rods
 - Steering box fixtures
 - Steering column

A lopsided steering wheel, significant deviations of camber/track values and noises when cranking the steering can be additional indications for the damage/deformations listed here.

This guideline is binding for all accident repairs to BMW and MINI vehicles.

Note:

If the steering box replacement work which is required for safety reasons is refused by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

For a corresponding example of the memorandum, see Service Information (bulletin) 320188(828) Appendix 1.

Actual situation of the steering column and steering shaft:

In the event of accidents or driving conditions similar to accidents, shock-like loads can cause different types of damage to the steering shaft and steering column. In case no external damage of the steering column and the steering shaft can be noticed, it is sometimes only possible to identify damage with great difficulty and with great effort.

Procedure for steering column and steering shaft:

The steering column and steering shaft must be replaced if one or more of the following points apply:

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- Unacceptable torque increase and jamming when the steering column is cranked from limit position to limit position (without hydraulic/electrical assistance)
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- If no damage is visible on the steering column, the mechanical steering column must be checked for an activated crash system:
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 2. Pull steering wheel out towards the driver (towards the body) until the physical limit position is reached, but do not use excessive force
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If no end stop is present when pulling out the steering column or the gaiter of the steering column shroud has tension, the crash system has activated and the steering column is to be renewed.

Note:

If the steering column/steering shaft replacement work which is required for safety reasons is rejected by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

For corresponding specimen of the memorandum, refer to Service Information 320188(828) Appendix 1

Attention!

The vehicle's operating licence will be invalidated whenever the function of any of its safety components is compromised!

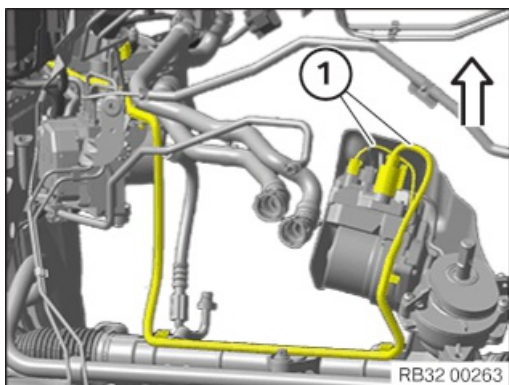


**Important!**Connecting line:

In the event of moisture/corrosion inside the two plug connections, check the insulation of the connecting line. If the insulation reveals any noticeable/striking features, partial replacement will be necessary. Otherwise it will be sufficient to replace the contacts or connector housing.

*Note:*

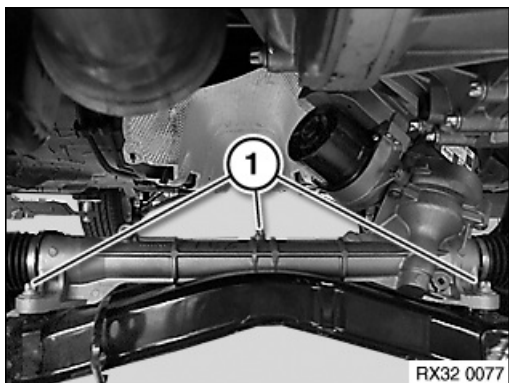
In a warranty case you must always provide a fault memory printout, even where there is no fault entry, with the defective part.

*Note:***Only for R5x right-hand drive vehicles:**

It is mandatory to ensure cable routing (1) on the steering gear is correct!

**Necessary preliminary tasks:**

- Disconnect negative battery cable
Note: High-current-carrying line laid with permanent positive connection (80 A fuse).
- Remove both track rod ends from swivel bearing
- Replacement: Remove both track rod ends from steering box
- Lower front axle support



Release screws (1). *Installation note:*

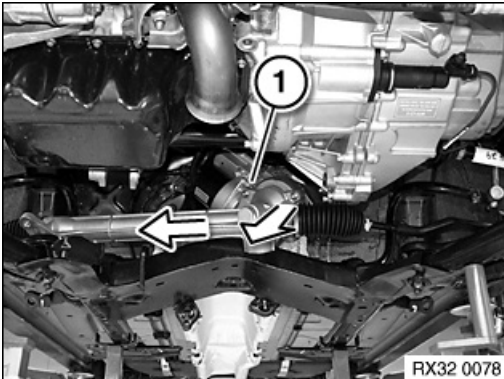
Tightening torque 32 00 1AZ.



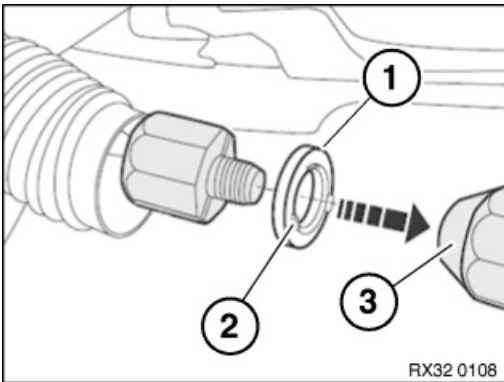
**Important!**

The control head of the steering box must not under any circumstances strike other components!

Collision with other components may result in damage to the steering box!



First swing steering box (1) in direction of travel to right and then remove towards front.

**Only on R55/R56/R57/R58/R59:****Important!**

On vehicles with 18" tyres, or if applicable for vehicles with sport brakes, it will be necessary to install steering stop limiters, to be ordered separately! →Also see the BMW spare parts catalogue!

Remove both track rods on steering box.

Remove both steering top limiters (1).

Installation note:

Deformation elements (2) must point to steering box (3).

**After installation:**

- Replacement only: Carry out programming/encoding
- Perform wheel alignment check



**Special tools required:**

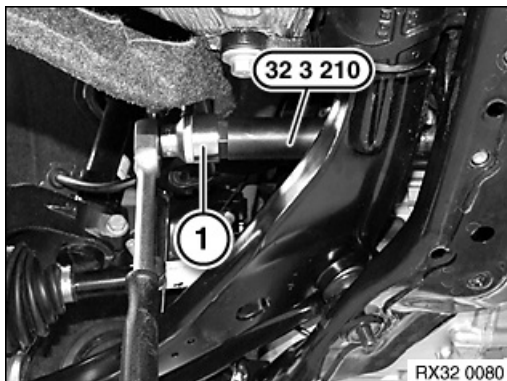
- 32 3 210

**Important!**

The steering box must be replaced if the polished surface of the rack is damaged (e.g. by corrosion)!

**Necessary preliminary tasks:**

- Remove track rod end from swivel bearing
- Remove gaiter from steering box and slide back

**Important!**

To avoid damage to rack and to suspension mounting, move rack in as far as possible.

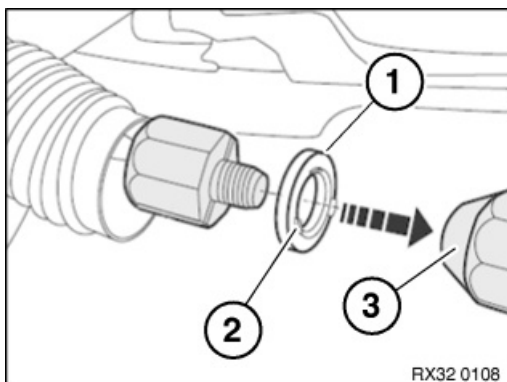
Release joint with special tool 32 3 210 and socket SW32 (1) on steering box rack. *Installation note:*

Clean rack.

Check surface of rack for damage (e.g. corrosion).

Grease toothed area of rack (refer to BMW Service Operating Fluids).

Tightening torque 32 21 3AZ.

**Replacement:****Important!**

On vehicles with 18" tyres and/or vehicles with Sport brake, if applicable, it will be necessary to install steering stop limiters to be ordered separately!

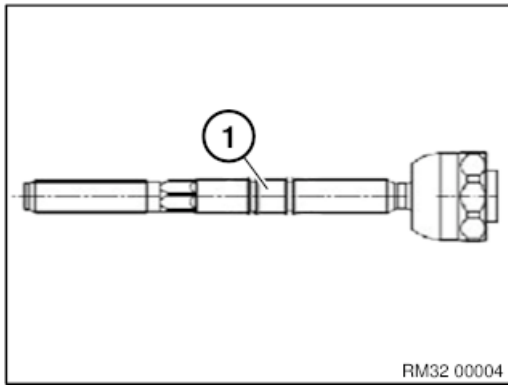
Slide both steering stop limiters (1) onto steering linkage.

Installation note:

Deformation elements (2) must point to steering box (3).

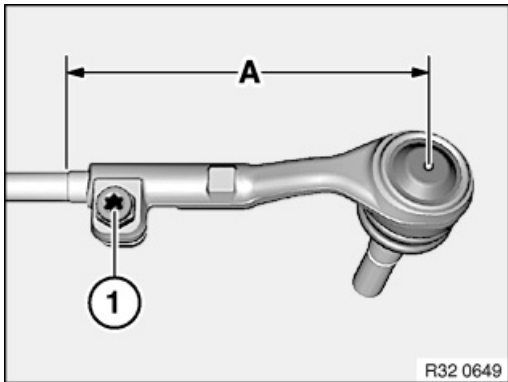
Tightening torque 32 21 3AZ.





On replacement, assemble new part with gaiter.

Grease track rod at the fit of the gaiter (1) with grease "FB-1 part number 2 208 093".



- Determine dimension (A) to simplify following adjustment of front axle

Installation note:

Slacken clamping bolt (1) and screw off track rod end.

Slide gaiter with ear clip and band clamp on track rod.

Screw in track rod end to dimension (A).

Tightening torque 32 21 2AZ.



After installation:

- Only if replacing/removing track rod end: Perform chassis / wheel alignment check



**Important!**

Make sure all parts are absolutely clean.

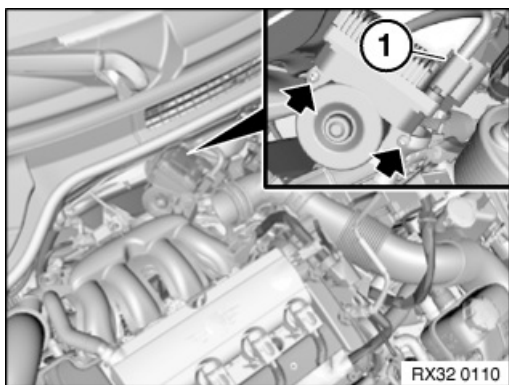
Absolutely avoid penetration of condensation and other dirt!

Failure to comply with this instruction will result in serious damage to electronic components!

Be especially careful of brake and fuel lines during repair work and absolutely prevent damage.

**Necessary preliminary tasks:**

- Disconnect negative battery terminal
- Remove air intake silencer housing



Unlock plug connection (1) in engine compartment and disconnect.

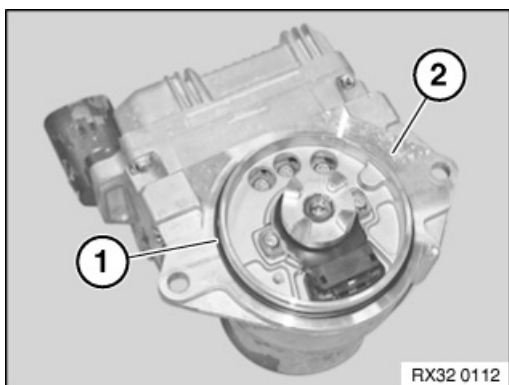
Release bolts on EPS unit (see arrow) from engine compartment.

Manually remove EPS unit upwards.

Installation note:

Replace screws.

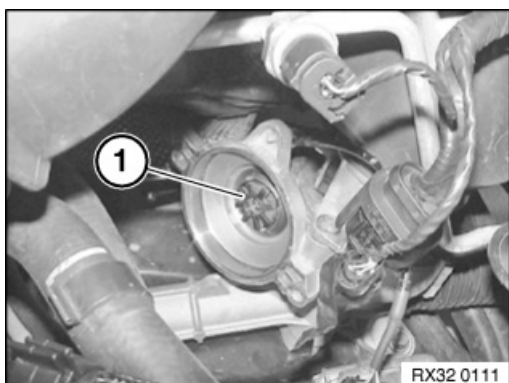
Tightening torque 32 00 2AZ.



Installation note:

Clean sealing surface (2).

Replace sealing ring (1).



Installation note:

- Insert new clutch (1) in the steering box and centre.
- Fit EPS unit carefully by hand, clutch (1) must engage noticeably in the driver of the EPS unit





After installation:

- Carry out programming/encoding
- Perform start-up of EPS unit

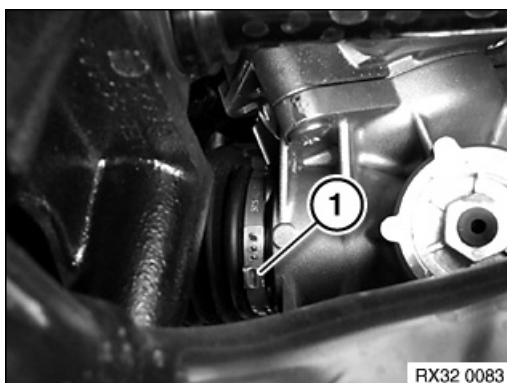


**Important!**

The steering box must be replaced if the polished surface of the rack is damaged (e.g. corrosion)!

**Necessary preliminary tasks:**

- Remove track rod end



Clean track rod.

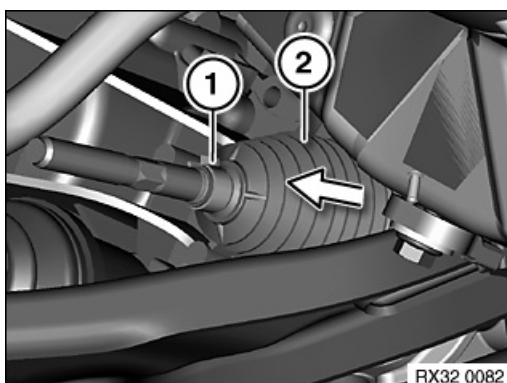
Release ear clip (1).

Installation note:

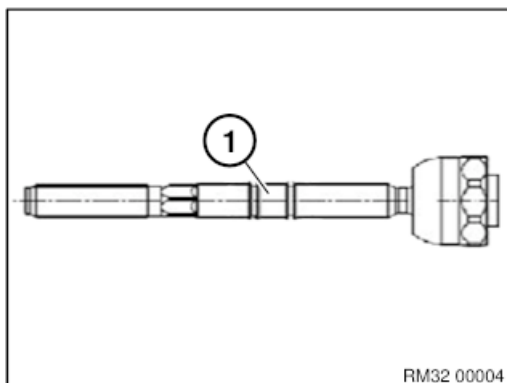
Clean rack and check surface for damage (e.g. by corrosion).

Grease rack (refer to Service Operating Fluids).

Release ear clip (1).



Release band clamp (1) and detach gaiter (2) from track rod.

*Installation note:*

Clean track rod and apply grease to taper.

Grease track rod at the fit of the gaiter (1) with grease "FB-1, part number 2 208 093". *Note:*

This ensures that the gaiter is not rotated when the track rod is rotated.





After installation:

- Perform wheel alignment check



**Special tools required:**

- 32 3 090

**Note:**

If the track rod end to track rod screw connection is released, it is necessary after reinstallation to carry out a wheel alignment check.

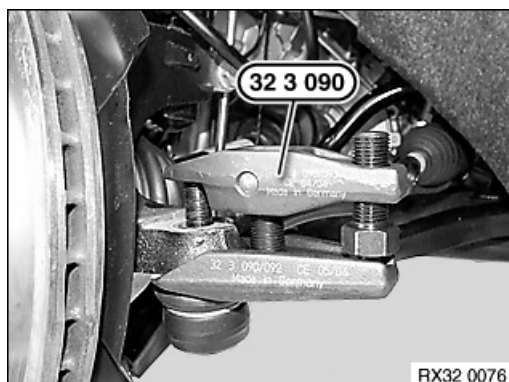
**Necessary preliminary work:**

- Remove front wheel

**Important!**

Do not release track rod end from swivel bearing with impact tool.

Rubber boot of track rod end must not be damaged!



Unfasten nut.

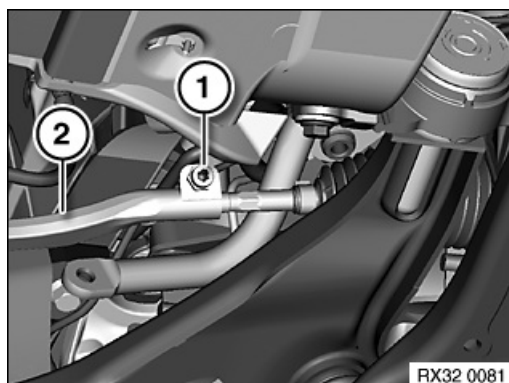
Press track rod end out of swivel bearing with special tool 32 3 090 .

Installation note:

Keep track rod end to swivel bearing connection clean and free from oil and grease.

Replace self-locking nuts.

Tightening torque 32 21 1AZ.



Mark thread depth of track rod end to simplify subsequent adjustment of front axle.

Release screw (1).

Screw off track rod end (2); if necessary, grip tie rod with open-end wrench.

Installation note:

Check gaiter for damage, replace if necessary.

Screw track rod end onto tie rod up to marking.

Tightening torque 32 21 2AZ.

**After installation:**

- Perform wheel alignment check





**Special tools required:**

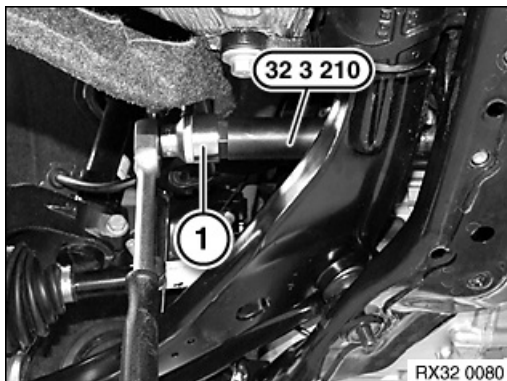
- 32 3 210

**Important!**

The steering box must be replaced if the polished surface of the rack is damaged (e.g. by corrosion)!

**Necessary preliminary tasks:**

- Remove track rod end from swivel bearing
- Remove gaiter from steering box and slide back

**Important!**

To avoid damage to rack and to suspension mounting, move rack in as far as possible.

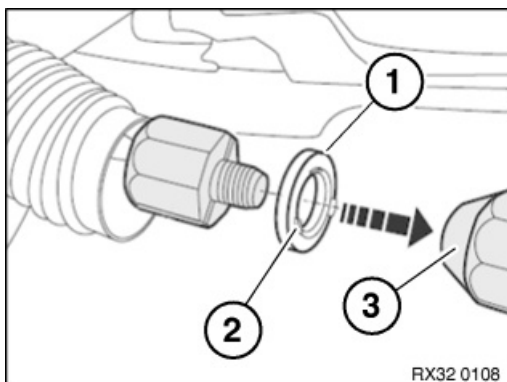
Release joint with special tool 32 3 210 and socket SW32 (1) on steering box rack. *Installation note:*

Clean rack.

Check surface of rack for damage (e.g. corrosion).

Grease toothed area of rack (refer to BMW Service Operating Fluids).

Tightening torque 32 21 3AZ.

**Replacement:****Important!**

On vehicles with 18" tyres and/or vehicles with Sport brake, if applicable, it will be necessary to install steering stop limiters to be ordered separately!

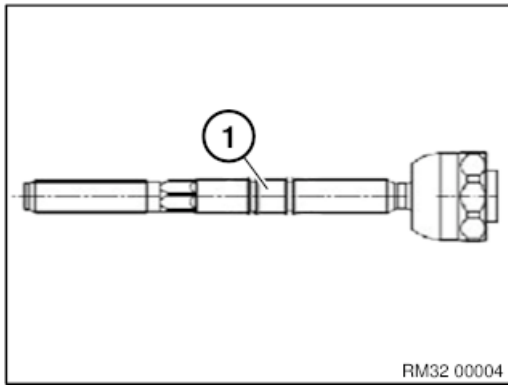
Slide both steering stop limiters (1) onto steering linkage.

Installation note:

Deformation elements (2) must point to steering box (3).

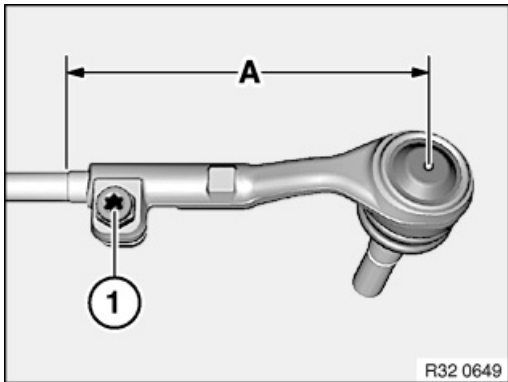
Tightening torque 32 21 3AZ.





On replacement, assemble new part with gaiter.

Grease track rod at the fit of the gaiter (1) with grease "FB-1 part number 2 208 093".



- Determine dimension (A) to simplify following adjustment of front axle

Installation note:

Slacken clamping bolt (1) and screw off track rod end.

Slide gaiter with ear clip and band clamp on track rod.

Screw in track rod end to dimension (A).

Tightening torque 32 21 2AZ.



After installation:

- Only if replacing/removing track rod end: Perform chassis / wheel alignment check

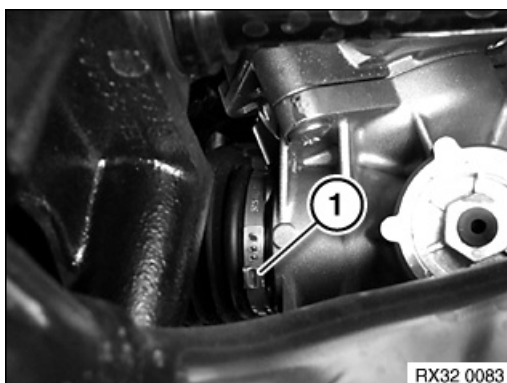


**Important!**

The steering box must be replaced if the polished surface of the rack is damaged (e.g. corrosion)!

**Necessary preliminary tasks:**

- Remove track rod end



Clean track rod.

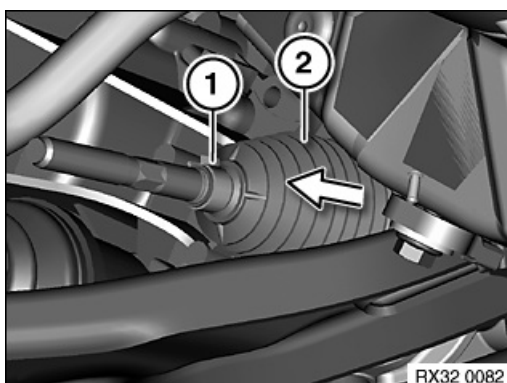
Release ear clip (1).

Installation note:

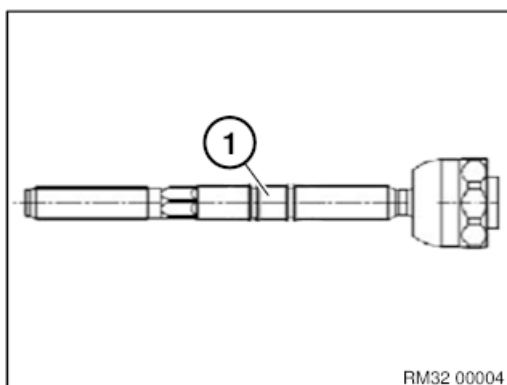
Clean rack and check surface for damage (e.g. by corrosion).

Grease rack (refer to Service Operating Fluids).

Release ear clip (1).



Release band clamp (1) and detach gaiter (2) from track rod.

*Installation note:*

Clean track rod and apply grease to taper.

Grease track rod at the fit of the gaiter (1) with grease "FB-1, part number 2 208 093". *Note:*

This ensures that the gaiter is not rotated when the track rod is rotated.





After installation:

- Perform wheel alignment check



**Special tools required:**

- 32 3 090

**Note:**

If the track rod end to track rod screw connection is released, it is necessary after reinstallation to carry out a wheel alignment check.

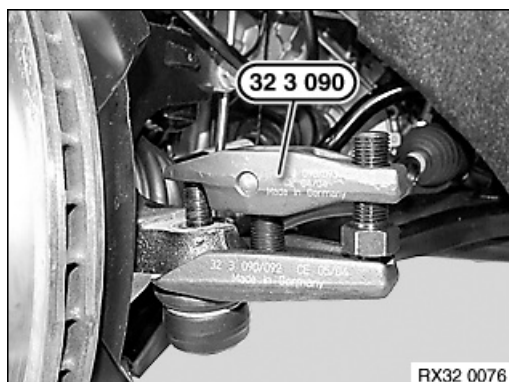
**Necessary preliminary work:**

- Remove front wheel

**Important!**

Do not release track rod end from swivel bearing with impact tool.

Rubber boot of track rod end must not be damaged!



Unfasten nut.

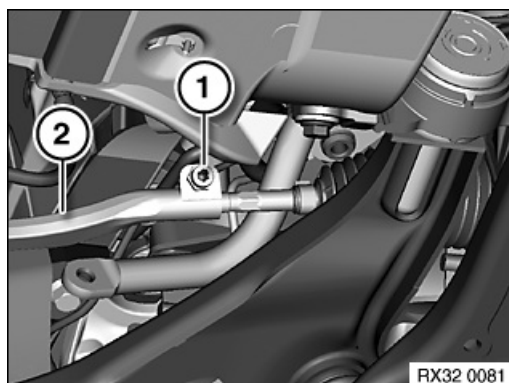
Press track rod end out of swivel bearing with special tool 32 3 090 .

Installation note:

Keep track rod end to swivel bearing connection clean and free from oil and grease.

Replace self-locking nuts.

Tightening torque 32 21 1AZ.



Mark thread depth of track rod end to simplify subsequent adjustment of front axle.

Release screw (1).

Screw off track rod end (2); if necessary, grip tie rod with open-end wrench.

Installation note:

Check gaiter for damage, replace if necessary.

Screw track rod end onto tie rod up to marking.

Tightening torque 32 21 2AZ.

**After installation:**

- Perform wheel alignment check



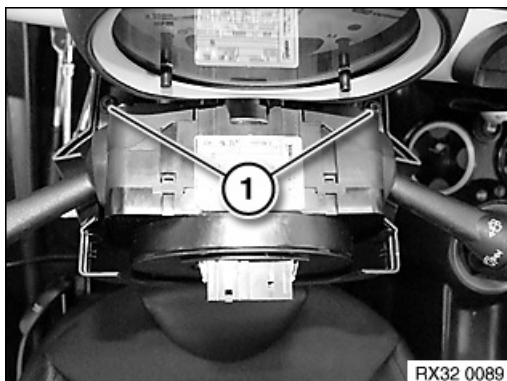


32 31 020 Removing and installing/replacing lower section of steering column shroud

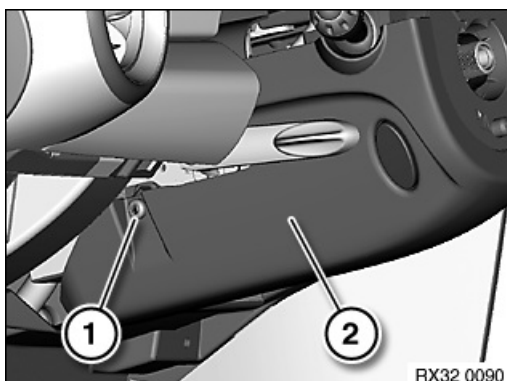


Necessary preliminary tasks:

- Remove top section of steering column casing.
- Remove lower instrument panel trim
- Remove the support for the trim panel of the dashboard on the bottom (R60/61)



Release screws (1).



Release screws (1) on left and right.

Remove the steering column shroud (2), if necessary, unclip the line for the steering column switch cluster.

Installation note:

Tightening torques 32 31 1AZ.



**Note:**

Steering angle sensor is only fitted in cars with Dynamic Stability Control (DSC).

Steering angle sensor is integrated in steering column switch cluster.

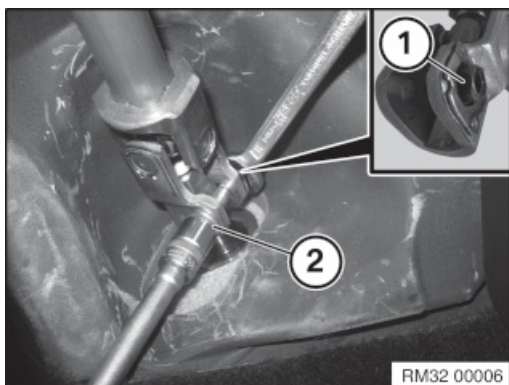
**After installation:**

- Replacement only: Carry out programming/coding
- Carry out steering angle sensor adjustment



**Necessary preliminary tasks:**

- Remove the top section of steering column casing
- Remove the left instrument panel trim at the bottom
- Remove the support for the trim panel of the dashboard on the bottom (R60/R61)
- Remove lower section of steering column shroud
- Remove the rev counter

**Important!**

If the steering shaft is separated from the steering gear, this can result in damage to the steering column switch cluster when the steering wheel is twisted!

After releasing screw (2), steering shaft must be retained with steering lock!

Nut (1) must be counter supported with open-end spanner AF 11 during disassembly and installation. Cage nut (1) can break off if this is not observed!

Steering column must be replaced when cage nut (1) is damaged!

Release screw (1) with reversible ratchet and extension, and simultaneously counter support with open-end spanner AF 11!

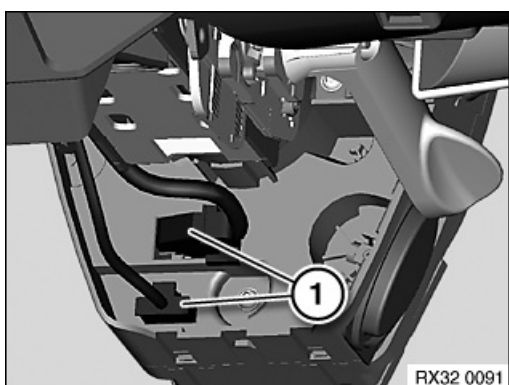
Pull off lower section of steering shaft from steering gear and swing towards rear.

Installation note:

Clean the thread to remove all remnants of the screw locking adhesive.

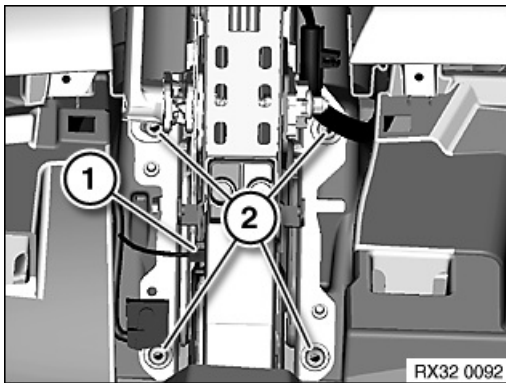
Replace screw.

Tightening torque 32 31 2AZ.



Disconnect the plug connections (1) on the steering column switch cluster.





Disconnect plug connection (1).

Release screws (2) and remove steering column towards rear.

Installation note:

Replace screws.

Tightening torque 32 31 3AZ.



Replacement:

- Remount steering column switch cluster



After installation:

- Version with Dynamic Stability Control (DSC): Carry out steering angle sensor adjustment

Note:

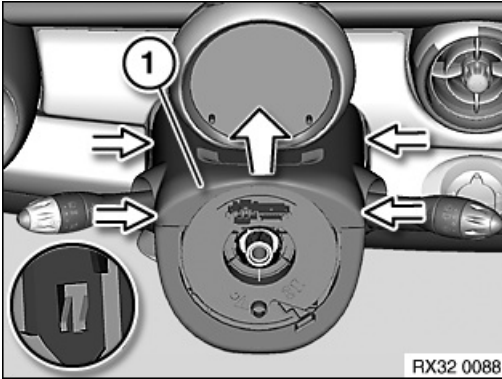
Only vehicles with a DSC have a steering angle sensor installed (integrated in the steering column switch cluster).





Necessary preliminary work:

- If necessary, remove rev counter from the steering column



Important!

Risk of damage!

Unclip steering column shroud (1) upwards and pull out via the front. *Note:*

Gently press down the steering column shroud upper section in the clips area.

For purposes of clarity, graphic does not show rear steering wheel. Do not remove the steering wheel!



32 33 010 Removing and installing (replacing) sports steering wheel / steering wheel



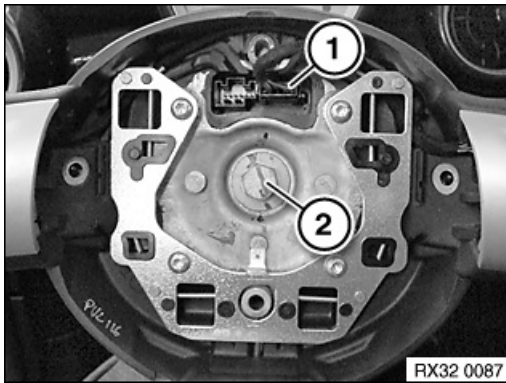
Note:

Chassis / wheel alignment is not necessary after the steering wheel has been removed and installed or replaced.



Necessary preliminary tasks:

- Remove airbag unit



Move wheels/steering wheel into straight-ahead driving position.

Disconnect plug connection (1).

Release screw (2) and remove sport steering wheel.

Installation note:

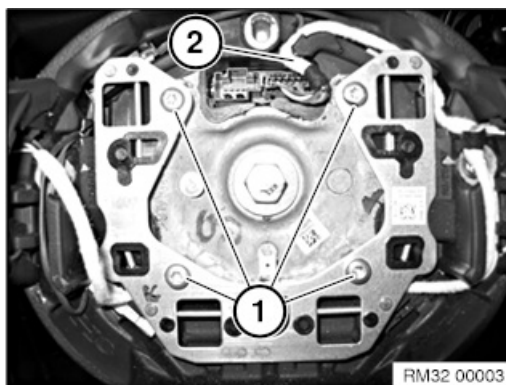
Make sure connecting line(s) is/are correctly laid.

Tightening torque 32 33 1AZ.



Replacement:

- Modify shift paddles
- Modify multifunction steering wheel switch / spoke covers
- Modify bottom sports steering wheel cover



Release screws (1) and remove airbag unit holding plate.

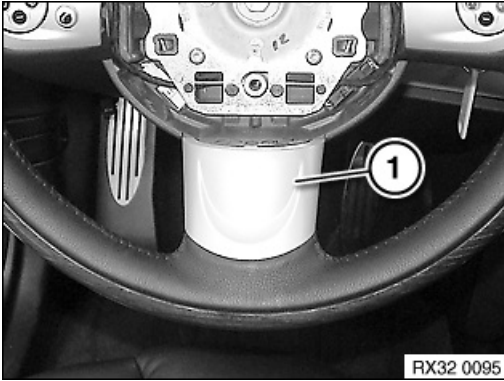
Remove wiring harness (2) and reinstall in new steering wheel.

Tightening torque 32 33 2AZ.



**Necessary preliminary tasks:**

- Remove airbag unit



Pull trim (1) off sport steering wheel with a suitable tool. *Installation:*
Trim is particularly sensitive to scratching.



72 12 ... Procedure after airbag deployment as result of an accident

Replace all components that were affected by the accident and check all others!

Check and/or replace following components after airbag deployment:

- Components
 - Sensor B-pillar (left/right)
 - Sensor front door (left/right)
 - Sensor seat, Driver-/passenger's side
 - Sensor, pedestrian protection
 - Front sensor (engine compartment)
 - Airbag control unit, vehicle interior
- Procedure
 - Inspect visually for mechanical damage (housing, plug connections). Replace damaged components.
 - Connect BMW diagnosis system
 - Read fault memory
 - Disconnect the vehicle battery and adhere to the waiting period (at least 30 seconds)
 - Rectify faults
 - Reconnect the vehicle battery and adhere to the waiting period (at least 10 seconds)
 - Delete fault memory
 - Switch off ignition and wait at least 2 minutes (no consumers may be switched on during this period such as interior light, radio, etc.)
 - Switch the ignition on (wait for at least 10 seconds)
 - Delete fault memory
 - If you cannot delete the fault memory: Replace the component that is causing the fault

Replace the airbag control unit in the following cases only:

- In the case of visible external damage
- In the case of a corresponding fault memory entry (airbag indicator light is illuminated)

Cables and connectors

- Components and procedure
 - Check cables and connectors for damage, replace if necessary.
(e. g. corrosion, correct engagement, bent pin)

Seat belt system

- Components
 - Automatic reel
 - Seat belt tensioner
 - Seat belt height adjustment
 - Anchor fitting tensioner
 - Seat belt buckle
- Procedure
 - Check components, replace if necessary
 - Additional door lock: Check for foreign body, remove it if necessary.

Seats

- Components
 - Seat
 - Airbag module
 - Active head restraint
- Procedure
 - Check seats (functional check of seat mechanism), replace if necessary



- Check seat connection
- Replace gas generator of active head restraint

If the severity of the crash has not caused any other damage to the seat, only the triggered gas generator needs to be replaced.

External feature: The triggered head restraint is folded forwards and engaged.

The repair work can be carried out in the vehicle with the rear panel removed. The entire system can be pushed back into its original position and the new gas generator installed.

The gas generator can be replaced up to 5 times.

- Replace airbag module and, if necessary, seat cover with upholstery

Driver's airbag

- Components
 - Airbag module
 - Steering Wheel
 - Steering column (if damaged)
- Procedure
 - Replace faulty components
 - Replace steering wheel

Front-passenger airbag

- Components
 - Airbag module
 - Dashboard trim panel (must be replaced with vehicles without replaceable airbag cover!)
 - Supporting tube (if damaged)
- Procedure
 - Check components; replace if necessary

Side airbag, front/rear

- Components
 - Airbag module
 - Door trim panel
 - Door in white
 - Seat
- Procedure
 - Check components; replace if necessary

Head airbag

- Components
 - Airbag module
 - A-pillar trim panel
 - Roofliner
 - Cover, B-pillar (if damaged)
 - C-pillar trim panel (if damaged)
 - Connection/mount (on side frame)
- Procedure
 - Check components; replace if necessary

Knee airbag

- Components
 - Trim panel (driver's side)
 - Lower section of glove box
 - Knee protection (Driver- and passenger's side)
- Procedure
 - Replace faulty components



Passive knee protection

- Components
 - Trim panels (driver's side)
 - Glove box incl. knee protection (passenger's side)
- Procedure
 - Replace faulty components
 - Check retaining elements



**Warning!**

Observe the following instructions without fail to avoid any risk of injury by the airbag unit.

- Comply with safety regulations when handling components with gas generators.
- Do not exert any force on the airbag unit.
- Use only specified tools for releasing the airbag unit.

Note: Incorrect handling can lead to airbag deployment and cause serious injury!

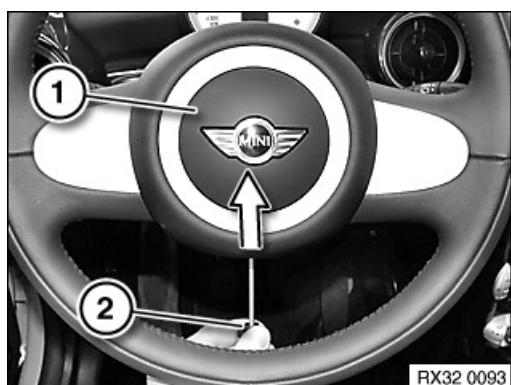
**Attention!**

Steering wheel must be replaced if airbag unit has been triggered!

Follow procedure after airbag deployment.

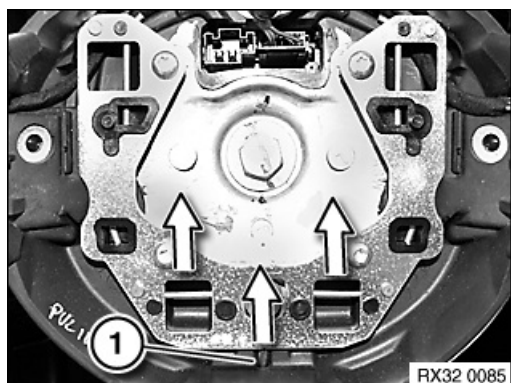
**Necessary preliminary work:**

- Disconnect battery earth lead



Insert a Torx screwdriver T25 (2) into the central opening on the steering wheel and press upwards in the direction of arrow until the airbag unit (1) is unlocked. **Note:**

Please observe the next figure, which clearly shows the unlocking procedure.

**Note:**

Push Torx screwdriver T25 (1) upwards.

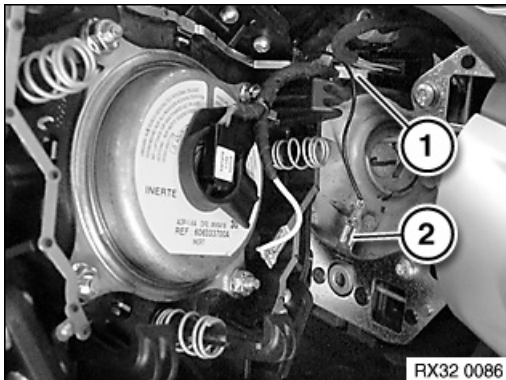
This pushes the mounting clip upwards and unlocks the airbag unit.



**Warning!**

Danger of injury!

Airbag unit may only be set down with the airbag itself facing upwards.



Disconnect plug connection (1).

Pull off grounding cable (2) and remove airbag unit.





Warning!

Observe the following instructions to avoid any risk of injury by the airbag unit.

- Comply with safety regulations for handling components with gas generators.
- Do not exert any force on the airbag unit.
- Use only specified tools for releasing the airbag unit.

Note: Improper handling may trigger the airbag and thereby cause serious injury.



Important!

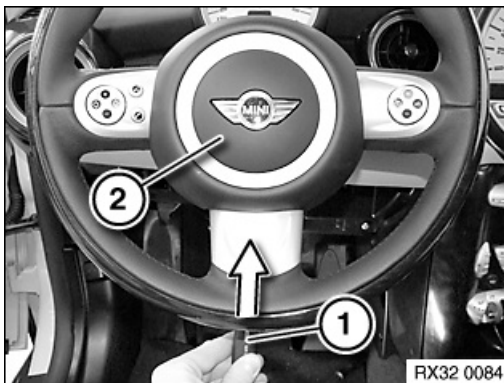
Steering wheel must be replaced if airbag unit has been triggered!

Follow procedure after airbag triggering.



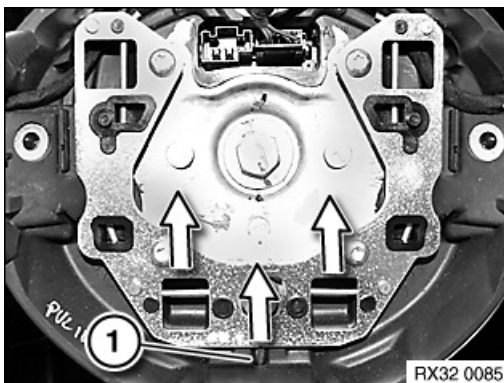
Necessary preliminary tasks:

- Disconnect battery negative lead



Insert Torx screwdriver T25 (1) into central opening on steering wheel and press upwards in direction of arrow until airbag unit (2) is unlocked. *Note:*

See next picture for better depiction of unlocking.



Note:

Press Torx screwdriver (1) upwards.

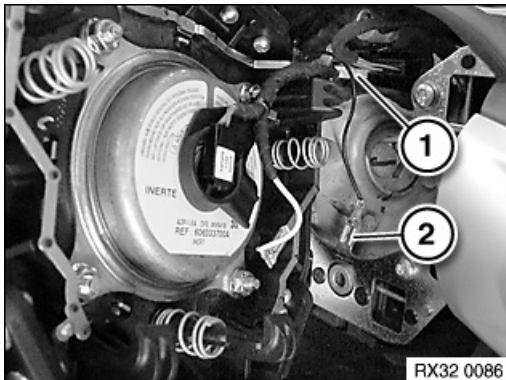
In this way, the retaining clip is pressed upwards and the airbag unit unlocked.



**Warning!**

Risk of injury!

Airbag unit may only be set down with the airbag itself facing upwards.



Disconnect plug connection (1).

Disconnect ground cable (2) and remove airbag unit.



72 00 ... Safety regulations for handling components with gas generators

It is essential to comply with the regulations as specified in the law relating to the use of explosives when working on airbag units and seat belt tensioners.

Airbags, seat belt tensioners etc. are pyrotechnical objects. Pyrotechnical objects are assigned to different danger classes on the basis of the quantity of propellant that they contain. The assignment can be ascertained from the identification marking on the product:

Important!

Failure to comply with the warning notices and repair instructions for gas generator components can cause accidental deployment and result in injury and vehicle damage!

This applies in particular to the following components:

- Airbag modules (driver's/front passenger airbags, side airbags)
- Buckle/belt tensioner
- Head airbag
- Active knee protection
- Active head restraint
- Safety battery terminal

1. Regulations

The regulations quoted in the following refer to the Federal Republic of Germany.

In all other countries, the relevant legislation and regulations must be observed in each case. Country-specific legal regulations that go beyond this information or court decisions based thereon must be followed in each case or given precedence over these regulations.

The following components used by BMW:

- Pyrotechnical restraint systems are subject to danger class PT1
- Gas generators are pyrotechnical objects belonging to danger class T1

Handling, transporting and storing non-fired gas generators are subject to the "Explosive Materials Act" (law relating to the use of explosives dated 13/09/1976).

The relevant trade supervisory authority must be notified at least 2 weeks before pyrotechnical objects are handled for the first time. Here the relevant authority must be notified in writing of the person responsible (e.g. dealership owner, holder of general power of attorney or if necessary workshop supervisor). A certificate of qualification, i.e. specific training, is not required for the person responsible.

2. Dismantling and installation

- Inspection, testing and installation work may only be carried out by expert trained personnel in BMW Service.
- Work on components of the airbag system should only ever be carried out with the battery disconnected, the negative terminal post covered and the plug connection of the cable leading to the gas generator disconnected. If only the battery is disconnected, the following prescribed waiting period must be observed without fail:
 - 30 min. for vehicles up to 9/93
 - 1 min. for vehicles from 9/93 onward
- In the event of breaks in work, a component with a gas generator that has been removed must be secured against access by other persons.
- Individual components must never be repaired. Instead, always replace them.
- Do not treat airbag system components with cleaning agents or grease.
- Components of the airbag system must not be exposed to temperatures in excess of 75 °C.



- Airbag system components, including electronic diagnostic components, which have been dropped from heights in excess of 0.5 m must not be reinstalled in the vehicles.
- Do not remove components of the airbag system from the original packaging until immediately before they are to be installed in the vehicle.
- Before installing, subject components such as housing, connector pins ,etc. of the airbag system (including diagnosis electronics) to a visual inspection for damage and replace if necessary.
- Airbag system components may only be electrically tested while they are installed and only with the BMW ISTA.
- **Danger of injury:** The airbag module may only be set down with the airbag itself facing *upwards*. Otherwise the alternator will be thrown upwards if it is ignited.
- Do not point the ignition squib of a gas generator at other persons.
- Components with gas generators must not be fired while they are removed. They must be disposed of by special disposal companies or returned to BMW in the packaging of the new components.
- When carrying out straightening and welding work with an electric welder:
 - Disconnect battery
 - Cover negative terminal (post)
- Avoid all contact with the skin when removing a fired airbag module - wear gloves. Wash with water after contact with the skin.

3. Transport

- Components with gas generators must be sent off in the packaging of the new components.

4. Storage

- Observe the regulations of the relevant trade supervisory authority and the applicable national regulations.



**Important!**

Make sure all parts are absolutely clean.

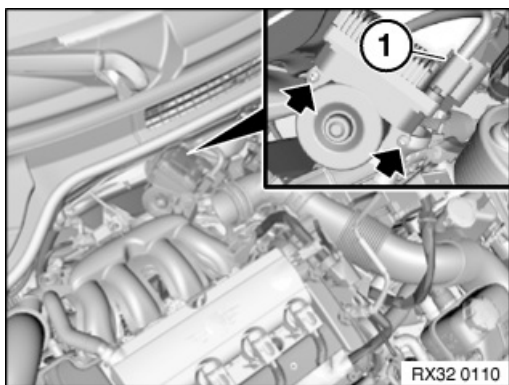
Absolutely avoid penetration of condensation and other dirt!

Failure to comply with this instruction will result in serious damage to electronic components!

Be especially careful of brake and fuel lines during repair work and absolutely prevent damage.

**Necessary preliminary tasks:**

- Disconnect negative battery terminal
- Remove air intake silencer housing



Unlock plug connection (1) in engine compartment and disconnect.

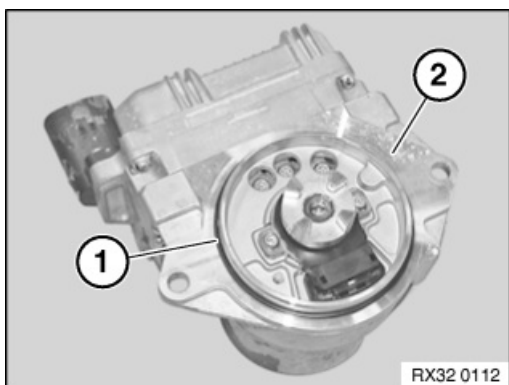
Release bolts on EPS unit (see arrow) from engine compartment.

Manually remove EPS unit upwards.

Installation note:

Replace screws.

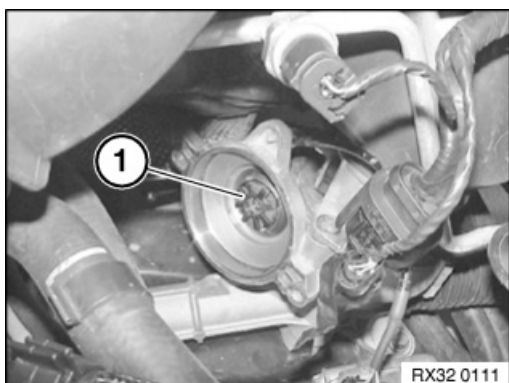
Tightening torque 32 00 2AZ.



Installation note:

Clean sealing surface (2).

Replace sealing ring (1).



Installation note:

- Insert new clutch (1) in the steering box and centre.
- Fit EPS unit carefully by hand, clutch (1) must engage noticeably in the driver of the EPS unit





After installation:

- Carry out programming/encoding
- Perform start-up of EPS unit





Screw securing adhesive is a means of preventing a screwed connection from being loosened by external influences.

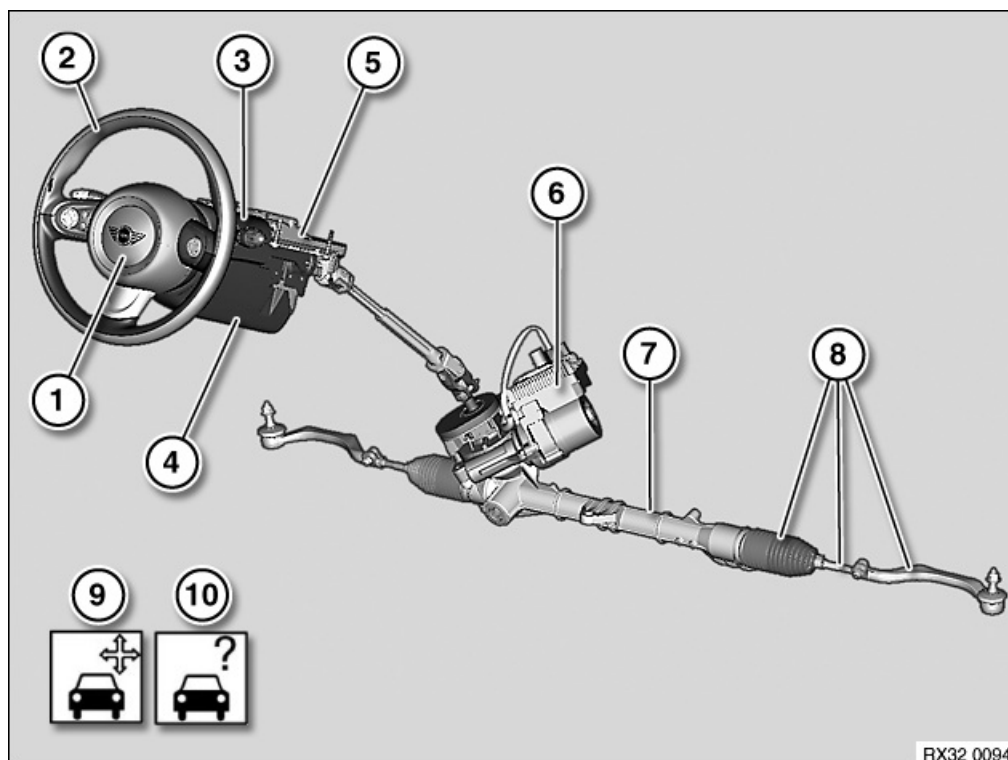
Once the screw has been coated with adhesive, the adhesive remains inactive until such time that it is activated by the encapsulation breaking when the screw is inserted and then cures (hardens) at room temperature.



Installation note:

- Screw connection must be completed within 20 mins. (start of curing)
- Microencapsulated screws must not be retightened
- Thread of nut must be cleaned beforehand in event of repeated use





Safety instructions and general information

1 Airbag unit	7	Steering gear (EPS)
2 Steering wheel	8	Track rod end, track rod, gaiter
3 Upper steering column casing	9	Adjustment work
4 Lower steering column casing	10	Troubleshooting
5 Steering column		
6 Electric motor with control unit		Version with Dynamic Stability Control (DSC): Carry out steering angle sensor adjustment



**Important!**

Make sure all parts are absolutely clean.

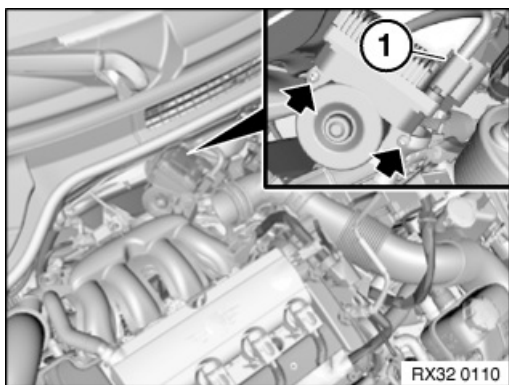
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Failure to comply with this instruction will result in serious damage to electronic components!

Be especially careful of brake and fuel lines during repair work and absolutely prevent damage.

**Necessary preliminary tasks:**

- Disconnect negative battery terminal
- Remove air intake silencer housing



Unlock plug connection (1) in engine compartment and disconnect.

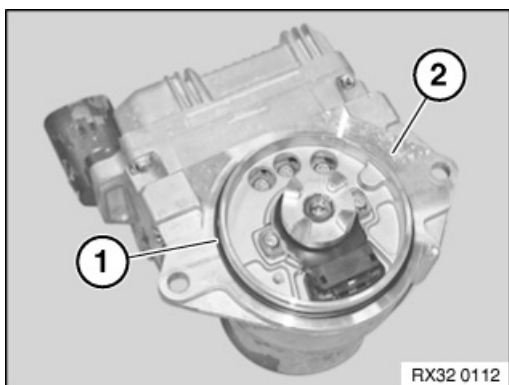
Release bolts on EPS unit (see arrow) from engine compartment.

Manually remove EPS unit upwards.

Installation note:

Replace screws.

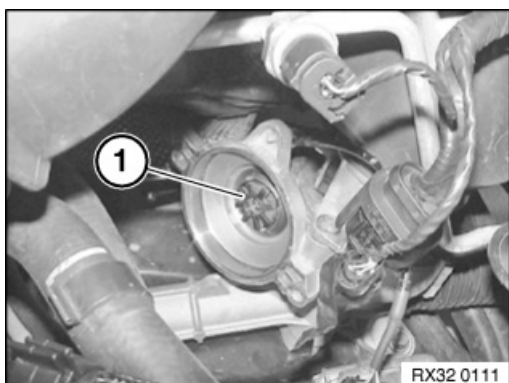
Tightening torque 32 00 2AZ.



Installation note:

Clean sealing surface (2).

Replace sealing ring (1).



Installation note:

- Insert new clutch (1) in the steering box and centre.
- Fit EPS unit carefully by hand, clutch (1) must engage noticeably in the driver of the EPS unit





After installation:

- Carry out programming/encoding
- Perform start-up of EPS unit



32 00 ... Test conditions for chassis/wheel alignment check

Observe the following test conditions prior to the chassis/wheel alignment check:

1. Only BMW approved wheel and tyre combinations are installed on the vehicle.
2. Correct tread depth. The tread depth for each axle may differ from left to right by max. 1-2 mm.
3. Correct tyre pressure (see label on vehicle).
4. All chassis and suspension components must be technically OK.
5. Condition of suspension and shock absorbers OK: Visually inspect for breakage, etc.



00 Danger of injury if oil comes into contact with eyes and skin



Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin



Protective measures/rules of conduct:

- Wear safety goggles.
- Wear oil-resistant protective gloves.
- Observe country-specific safety regulations.



First aid measures:

- Eye contact: Immediately rinse out eyes with lots of water and for at least 15 minutes. In the case that it is available, use an eye wash bottle. If eye irritation persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

Note: Do not use solvents/thinners.



**Danger of poisoning!**

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

**Protective measures/rules of conduct:**

- Fill oil in appropriately marked containers only.
- Do not pour oil in drinking vessels (beverage bottles, glasses or cups).
- Observe country-specific safety regulations.

**First aid measures:**

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.



33 00 ... Information on replacing shock absorbers

Situation:

When a shock absorber is faulty on one side (leaking, noises, limit values exceeded on the shock tester), often both shock absorbers on the axle in question are replaced.

Effect:

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as defective parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure:

If one shock absorber is damaged, it is only necessary to replace both shock absorbers when the car has driven in excess of 80 000 km.

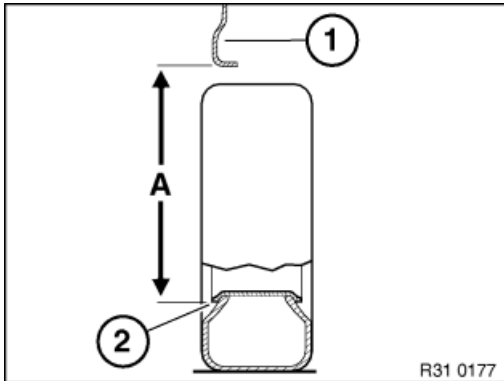


33 53 ... Measuring vehicle ride height



Necessary preliminary tasks:

- Move vehicle into normal position.



Determine actual ride height (A) - to do so, attach tape measure to rim flange (2) at bottom middle and measure to wheel arch cover (1).



31 00 ... Notes on wheel bearing replacement following accident damage

Wheel bearing facts:

In the event of accidents or driving conditions similar to accidents, shock-like loads to the wheel bearing units can cause slight damage to the bearing track. Despite initial running without noise, with continued use, this results in later noise generation at the wheel bearing.

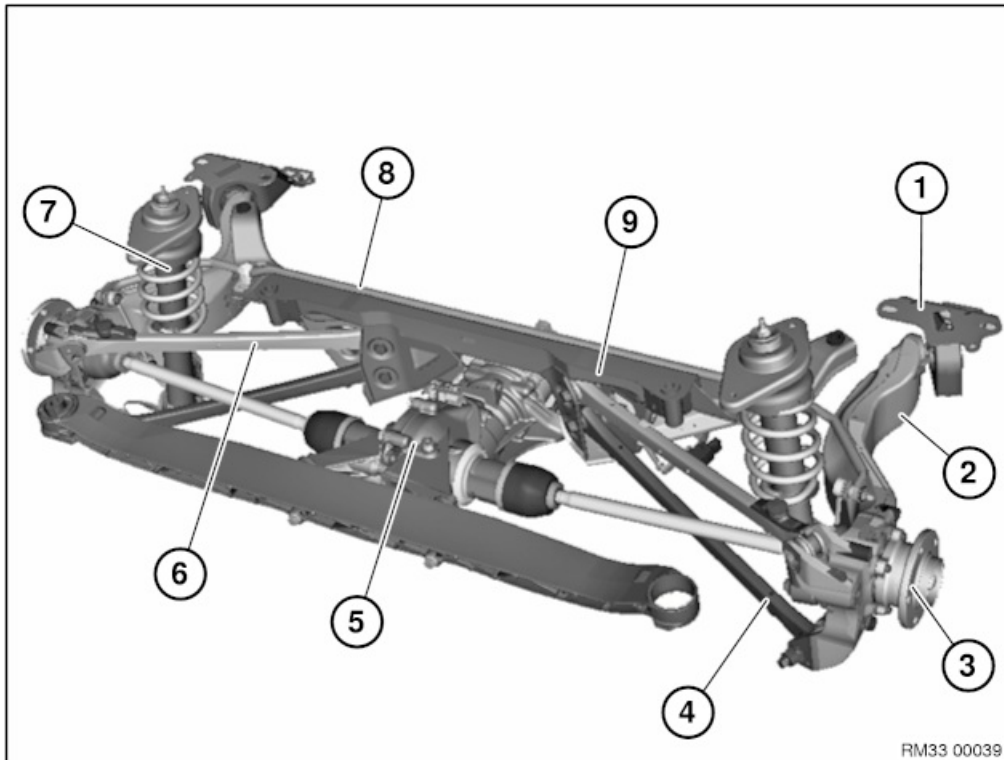
Procedure:

The wheel bearing must be replaced on the damaged side of the axle if one or several of the following points apply:

- Visible or noticeable damage to the wheel bearing
- Rolling noises, radial/lateral runout on the wheel bearing
- Permissible tolerance for the wheel alignment is exceeded and no longer adjustable without the exchange of additional components
- Damage, permanent deformation or fractures to:
 - Wheel rims (major damage) and simultaneous negative result for wheel alignment
 - Spring struts, swivel bearings, wheel carriers
 - Wishbones
 - Struts or trailing links or anti-roll bar with this function
 - Body-side screwing/attachment points for wheel guide/control components
 - Track rods
 - Steering box fixtures

This guideline is binding for all accident repairs to BMW, MINI and Rolls-Royce vehicles!





Safety precautions & general information

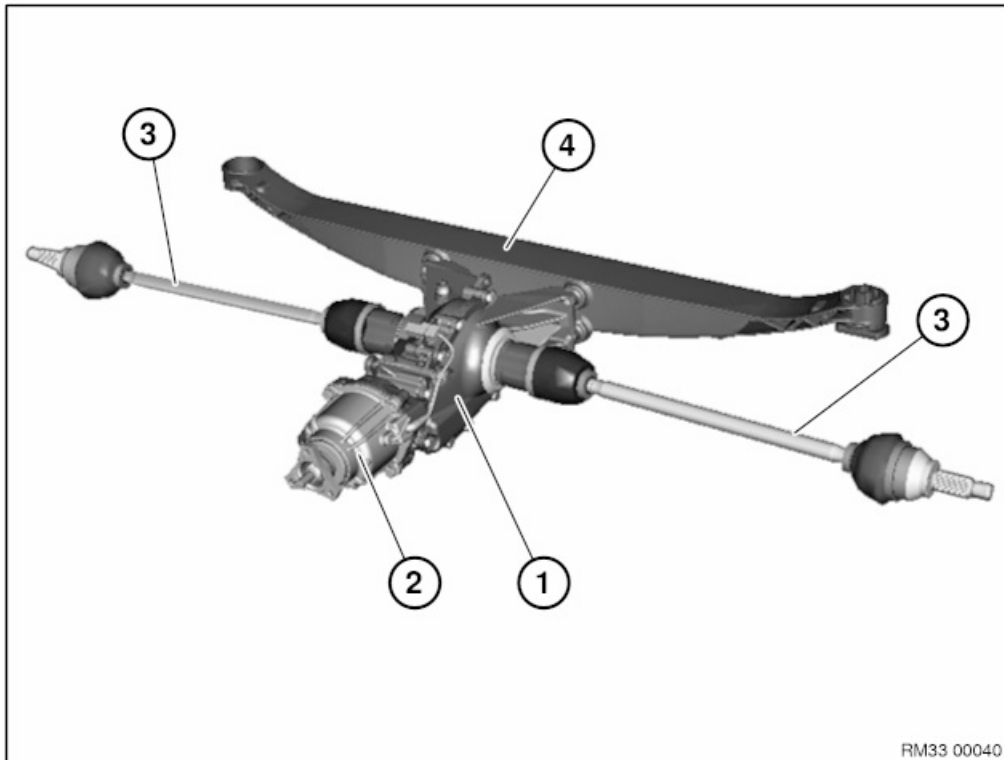
- 1 Bracket, trailing arm/rubber mount
- 2 Trailing arm
- 3 Wheel bearing
- 4 Lower wishbone
- 5 Overview of rear axle final drive/output shafts
- 6 Upper wishbone
- 7 Spring strut shock absorber.
- 8 Anti-roll bar / rubber mount / anti-roll bar links
- 9 Rear axle carrier

Adjustment work

Testing

Troubleshooting

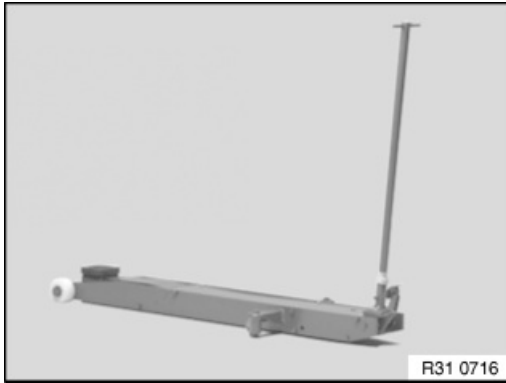




Safety instructions & general information

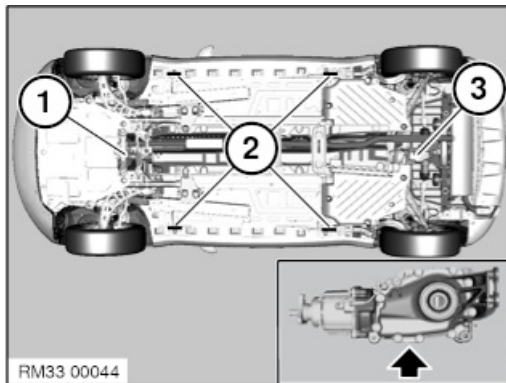
- 1 Rear axle final drive
- 2 Clutch
- 3 Output shafts
- 4 Cross member



**Caution!**

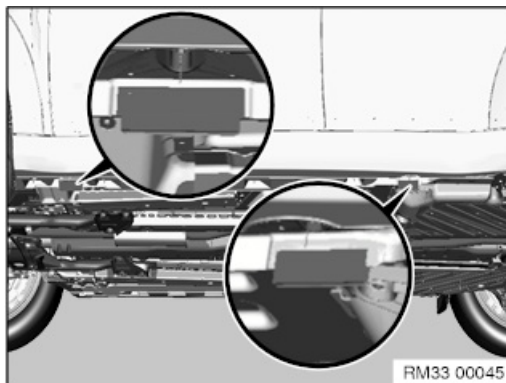
Observe the following trolley-jack-related notes:

1. Only BMW-distributed/approved trolley jacks which have a rubber plate on their mounting are to be used.
2. Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!
3. Check the rubber plate on the trolley jack prior to each use, replacing if necessary.

**Warning!**

The vehicle may be raised with a trolley jack only at the following mounting point!

- 1 Front strut at front axle support
- 2 Side car jacking points
- 3 Rear axle differential (only all-wheel drive vehicle)

**Risk of damage!**

Align the rubber plate on the trolley jack to the jacking points in such a way so there is no contact to adjacent components and they are therefore not damaged.

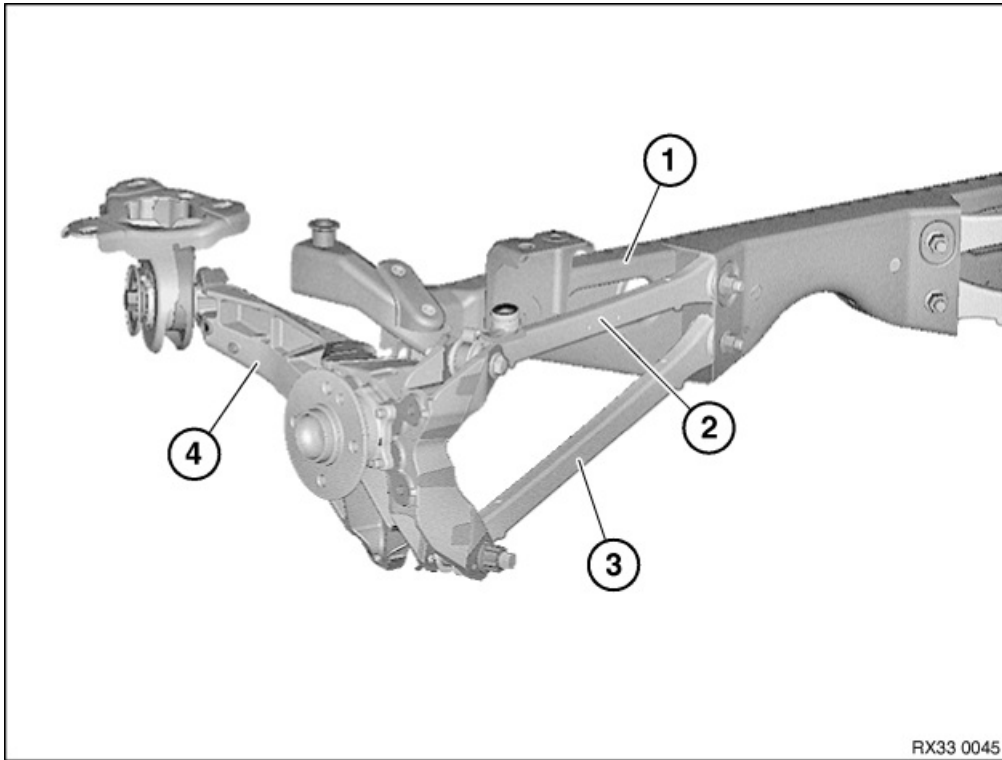


33 10 ... **Rear axle final drive: Assignment to model series**

Model series	Engine	Rear axle final drive	Remarks
R60, R61	N16, N18, N47T	148AL	



33 00 ... Rear axle: perform wheel alignment after the following repair work



Perform wheel alignment after the following repair work:

- Release the following screw connection:
 - Trailing arm holder to body
 - Upper wishbone to rear axle carrier
 - Bottom wishbone at the rear axle support/trailing arm
- Replacement of following parts:
 1. Rear axle support
 2. Upper wishbone
 3. Lower wishbone
 4. Trailing arm/trailing arm holder/rubber mount



**Warning!**

Danger of poisoning if oil is ingested/absorbed through the skin!

Risk of injury if oil comes into contact with eyes and skin!

**Recycling:**

Observe country-specific waste disposal regulations.

**Measures if oil is unintentionally released:**

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

Note: Do not flush oil away with water or aqueous cleaning agents.



**Warning!**

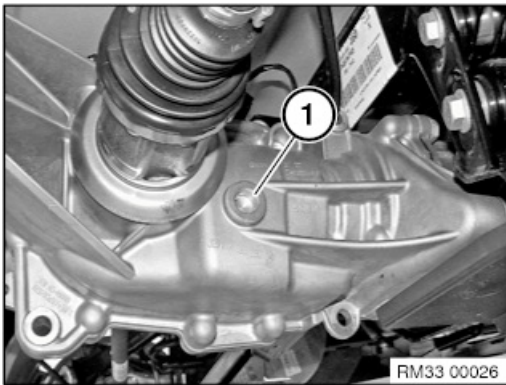
Danger of poisoning if oil is ingested/absorbed through the skin!

Risk of injury if oil comes into contact with eyes and skin!

Important!

Risk of damage!

To avoid serious damage to the rear axle final drive, it is essential to use only approved gearbox oils in the rear axle final drive.



Open screw plug (1).

Check oil level.

If necessary, pour in final drive oil up to lower edge of opening for screw plug (1).

Installation note:

Replace screw plug (1) with O-ring.

Tightening torque 33 11 1AZ.



33 10 ... **Rear axle final drive: Assignment to model series**

Model series	Engine	Rear axle final drive	Remarks
R60, R61	N16, N18, N47T	148AL	



**Special tools required:**

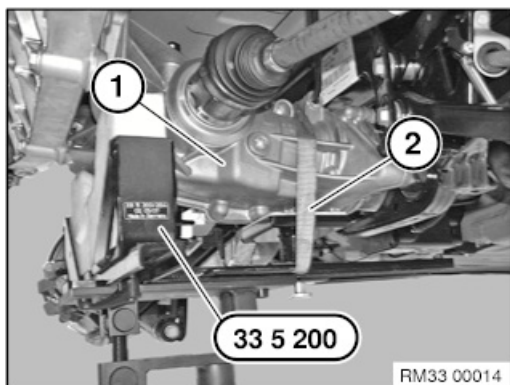
- 33 5 200

**Necessary preliminary tasks:**

- Remove vehicle underbody cover.
- Remove exhaust system.
- Remove and tie back propeller shaft on rear axle differential.

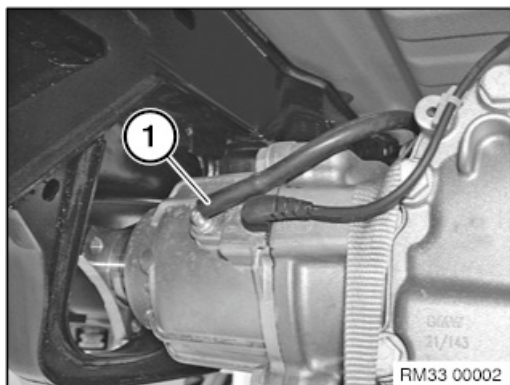
**Attention!**

- The rear axle final drive may not be tilted by more than 45° during the installation procedure.
- When reinstalling the current rear axle differential, both radial shaft seals of the output shafts must be replaced!
- The circlips on both output shafts must be replaced!



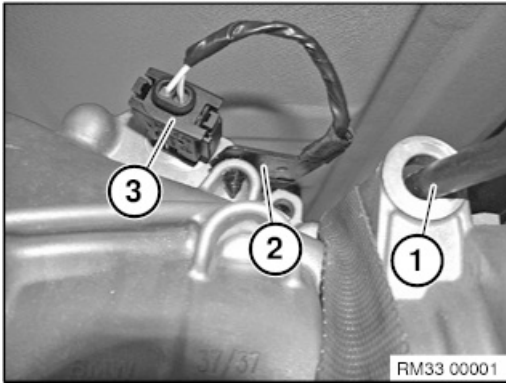
Support rear axle final drive (1) with workshop jack and special tool 33 5 200 .

Secure rear axle differential against falling out with tensioning strap (2).

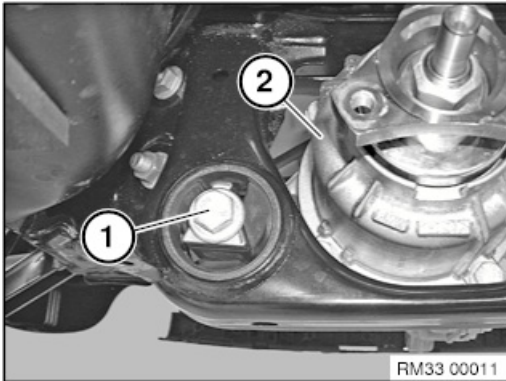


Pull off vent hose (1) from connection.

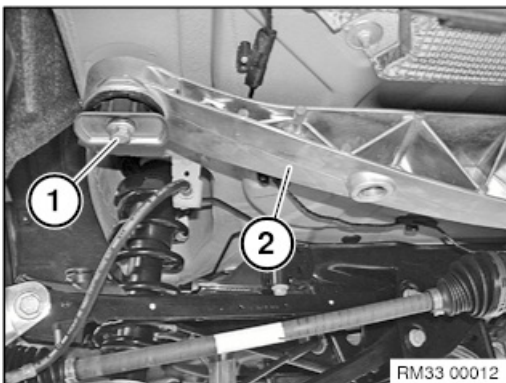




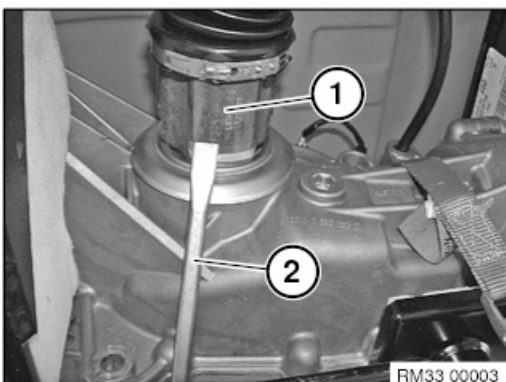
Feed out vent hose (1) from bore hole.
Release holder (2) from rear axle final drive.
Disconnect plug connection (3).



Release screw (1) on rear axle differential (2).
Tightening torque 33 17 1AZ

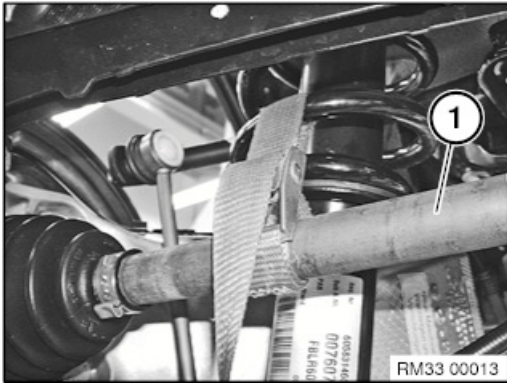


Release screw (1) on cross member (2). (right-hand side is identical).
Tightening torque 33 31 2AZ.



Drive out both drive shafts (1) with suitable tool (2).
Feed drive shafts (1) out of transmission by shifting rear axle final drive sideways.
Remove rear axle final drive.





Do not leave drive shafts (1) hanging in joints.
Tie up drive shafts (1) on suspension spring.



Installation note:

Risk of damage!

When inserting the output shaft, make sure that the connector gearing of the output shaft does not touch the sealing lip (inner) of the radial shaft seal!

Otherwise, the radial shaft seal will be damaged or oil leaks may occur!

After installation:

- Check oil level in the rear axle final drive, correct if necessary.



Replacement:

- Remount clutch to rear axle differential
- Top up oil in rear axle differential.

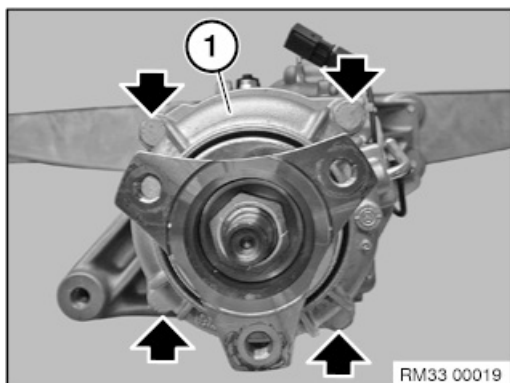


**Necessary preliminary tasks:**

- Remove rear axle final drive.

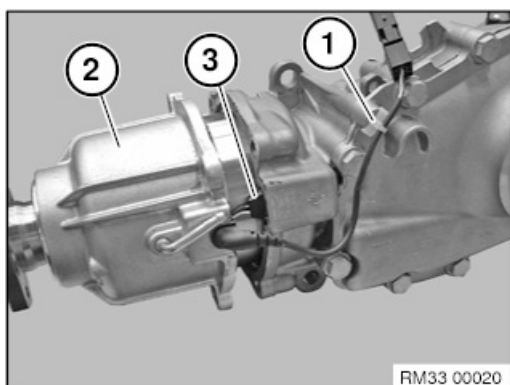
**Attention!**

- The rear axle final drive must not be tilted by more than 45° during the installation procedure.
- After every removal and installation, the radial shaft seal of the drive flange must be replaced.
- **Vehicles up to 03/2011 without E/K Word "VGEU" in the vehicle order**
Encode the DSC control unit using the following path!
ISTA/P → Menu → Conversions → Replacement Hang-on clutch



Release screws at clutch housing (1).

Tightening torque 33 10 1AZ.



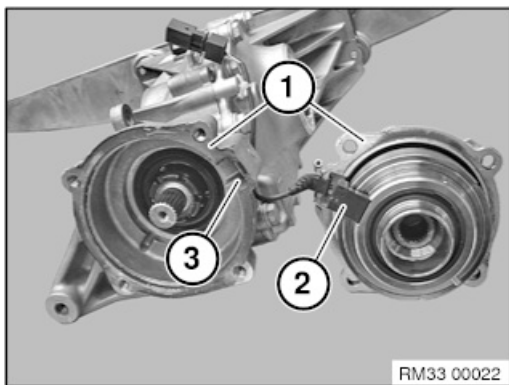
Release cable clip (1) from rear axle final drive.

Carefully pull clutch (2) out of housing.

Note:

Check installation position of electronic component (3).





Installation note:

Free sealing surfaces (1) of debris and clean.

Apply Loctite 5970 sealing compound.

Place electronic component (2) in recess (3).



After installation:

- **Vehicles up to 03/2011 without E/K Word "VGEU" in the vehicle order**

Encode the DSC control unit using the following path!

ISTA/P → Menu → Conversions → Replacement Hang-on clutch



33 10 023 right

Replacing radial shaft seal for output shaft at rear axle, left or



Special tools required:

- 00 5 010
- 32 1 060
- 31 5 130



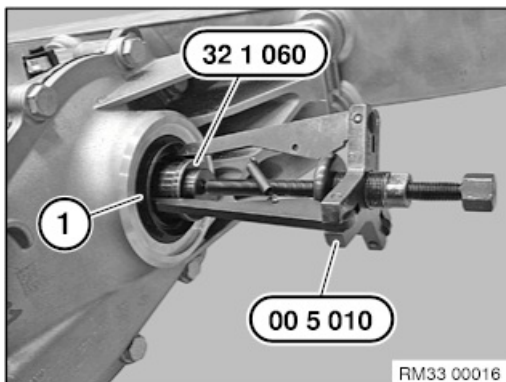
Necessary preliminary tasks:

- Remove rear axle final drive.

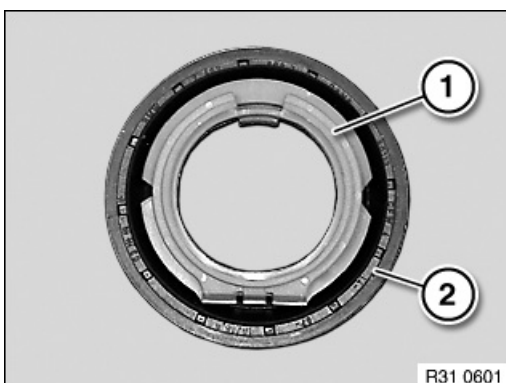


Attention!

- The rear axle final drive may not be tilted by more than 45° during the installation procedure.



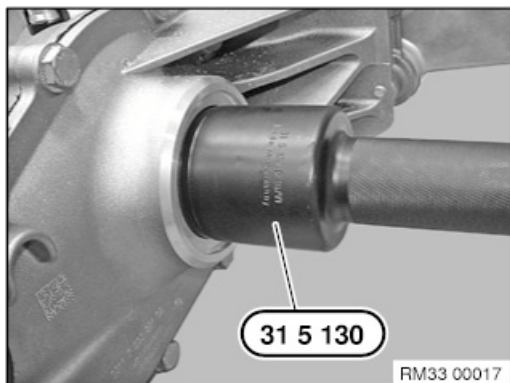
Pull out radial shaft seal (1) with special tools 00 5 010 and 32 1 060 .



Installing new shaft seal: Note:

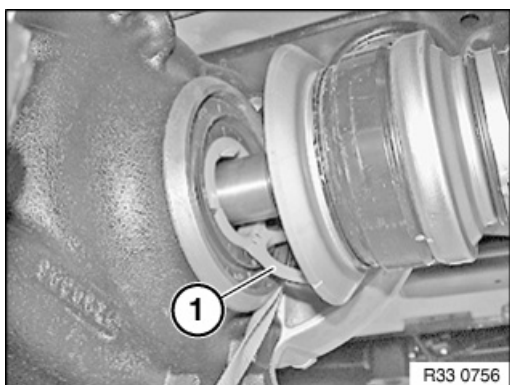
The installation protective ring (1) serves to protect the sealing lips of the radial shaft seal (2) when installing the output shaft.





Wet sealing lips and housing sheet metal flange of new radial shaft seal with final drive oil.

Drive in radial shaft seal with special tool 31 5 130 .



Installation note:

Insert output shaft into rear axle differential.

Pull out assembly protection ring at lug (1) until one of the two predetermined breaking points gives.



After installation:

- Check transmission oil level, correct if necessary.



**Special tools required:**

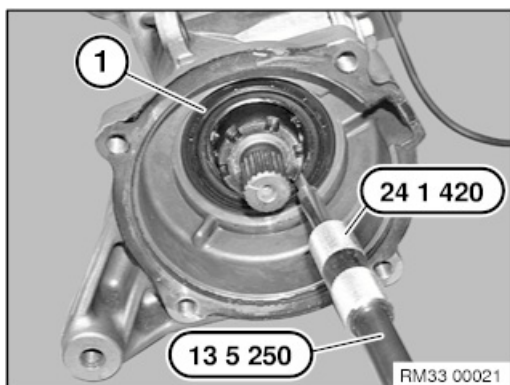
- 24 1 420
- 13 5 250
- 33 0 090

**Necessary preliminary tasks:**

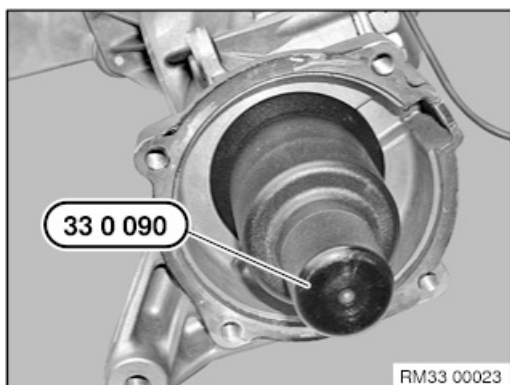
- Remove clutch of rear axle final drive.

**Important!**

- The rear axle final drive may not be tilted by more than 45° during the installation procedure.



Pull out radial shaft seal (1) with special tools 24 1 420 and 13 5 250 .



Wet sealing lips and housing sheet metal flange of new radial shaft seal with final drive oil.

Drive in radial shaft seal with special tool 33 0 090 .

**After installation:**

- Check transmission oil level, correct if necessary.

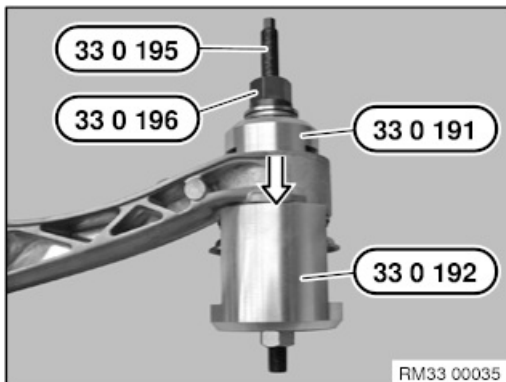


**Special tools required:**

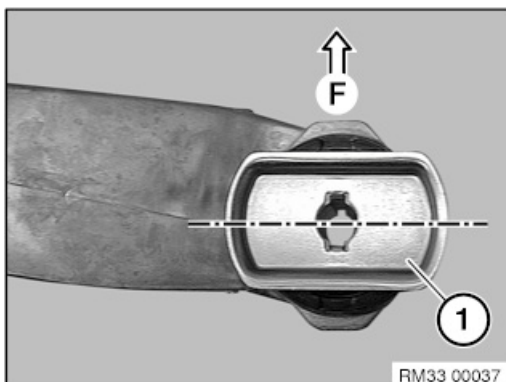
- 33 0 191
- 33 0 195
- 33 0 196
- 33 0 192
- 33 0 193
- 33 0 194

**Necessary preliminary work:**

- Remove cross member.

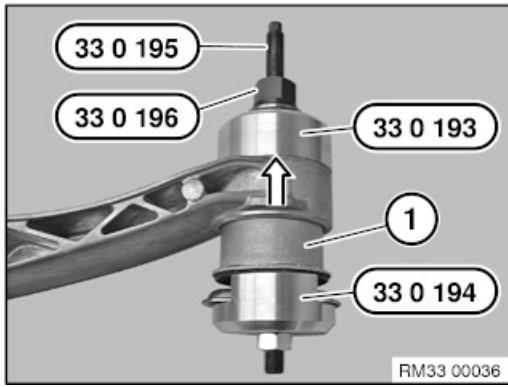
**Withdrawing rubber mount:**

Place special tool 33 0 191 into the recesses on the rubber mount. Pull the rubber mount together with special tools 33 0 195 , 33 0 196 , 33 0 192 out toward the bottom.

**Installing rubber mount: Important!**

Align the rubber mount according to the metal plate (1), perpendicular to the longitudinal direction of the vehicle.





Pull the rubber mount (1) into the cross brace using special tools 33 0 193 , 33 0 194 , 33 0 195 , 33 0 196 toward the top.



33 17 502 Replacing rubber mount for rear axle final drive/rear axle support (rear axle final drive removed)

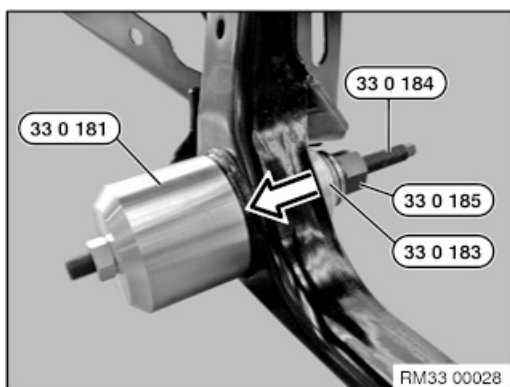


Special tools required:

- 33 0 181
- 33 0 184
- 33 0 185
- 33 0 183
- 33 0 182

Withdrawing rubber mount:

Use special tools 33 0 181 , 33 0 184 , 33 0 185 , 33 0 183 to pull out rubber mount in direction of travel.



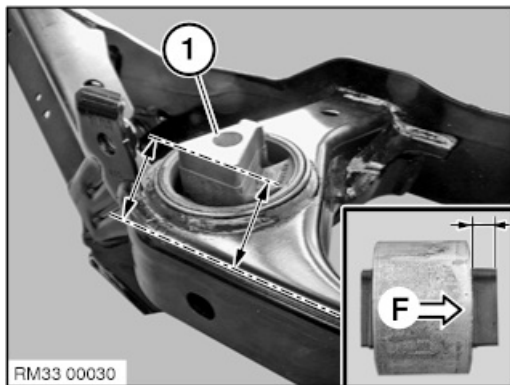
Installing rubber mount:

Important!

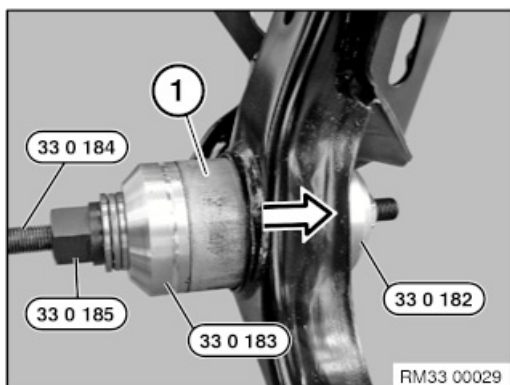
Coat bearing bush in rear axle support and new rubber mount with Circo Light (refer to BMW Parts Service).

Using the bottom flat, align rubber mount (1) parallel with the rear axle support.

Make sure that the protrusion (16 mm) of the rubber mount points in forward direction.



Using special tools 33 0 184 , 33 0 185 , 33 0 183 , 33 0 182 to fit (opposite direction of travel) rubber mount sleeve (1) flush in rear axle support.

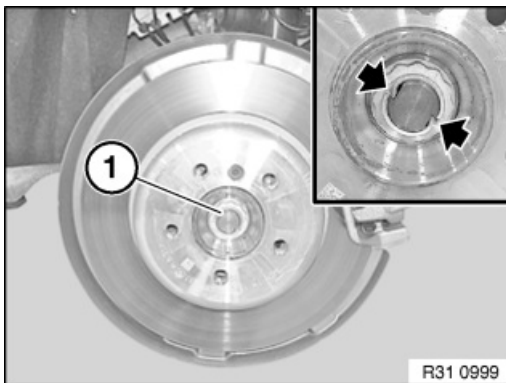


**Important!**

- The radial shaft seal for the output shaft should be replaced every time the output shaft is removed and installed.

**Necessary preliminary work:**

- Remove rear axle final drive.
- Remove rear wheel.

**Important!**

Expand anti-twist lock sufficiently to avoid damaging thread when releasing collar nut (1).

Activate parking brake and release collar nut (1).

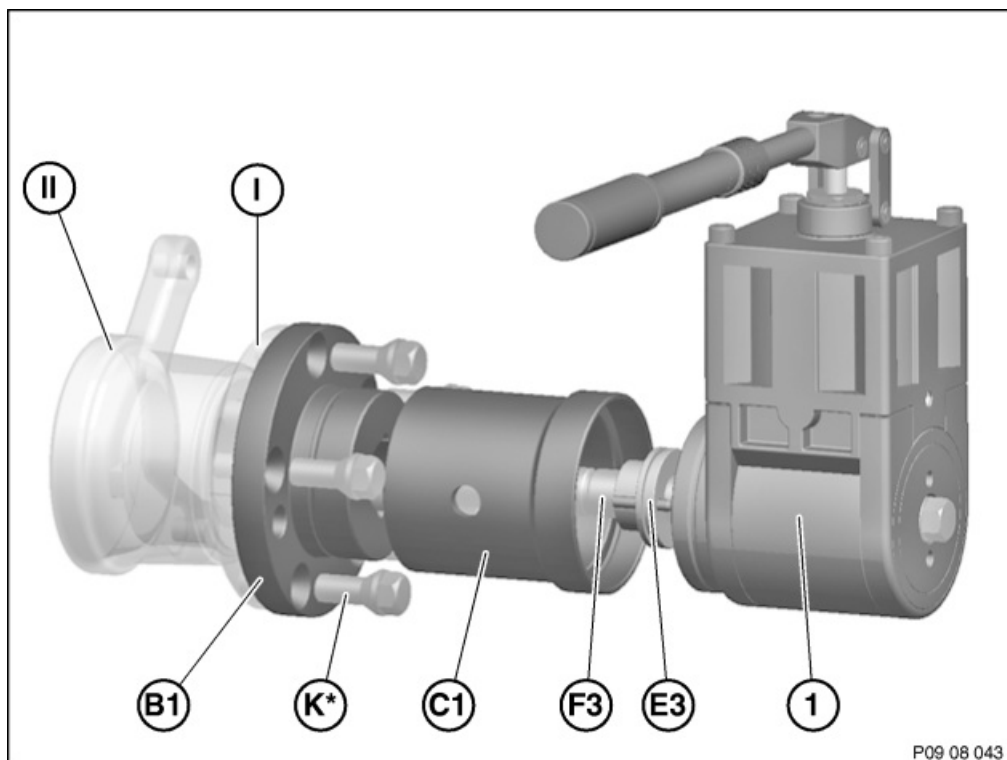


Use **special tool** , see **BMW Workshop Catalogue**.

- Hydraulic unit - 81 64 2 155 744
- Adapter kit - 81 64 2 294 517
- Adapter for torque wrench - 81 64 2 318 661

The following work steps describe pressing out the output shaft:





The following tools are required to press out the output shaft from the drive flange, see graphic for arrangement:

Vehicle components:

I	Drive flange hub
II	Wheel carrier/swivel bearing
K*	Wheel stud M14 x 1.5

Required special tool components:

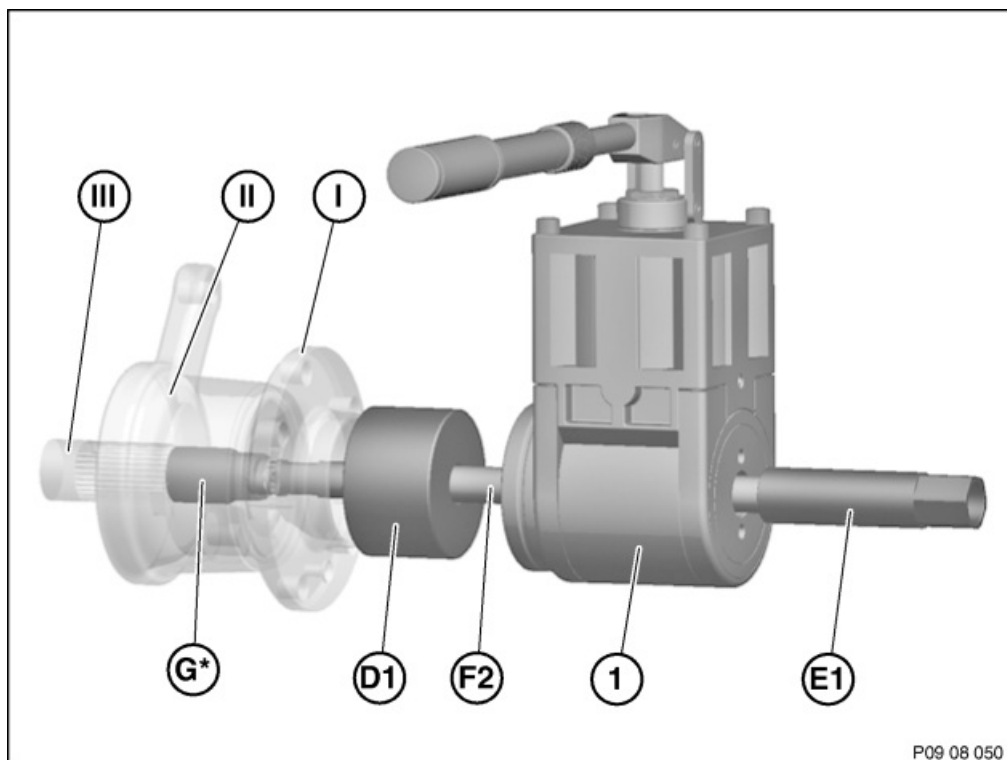
1	Hydraulic unit
E3	Washer M24
F3	Spindle M24 (length 270 mm)
C1	Holding sleeve
K*	Wheel stud M14 x 1.5
B1	Adapter

Secure output shaft against falling out.

Press out output shaft with hydraulic unit.

The following work steps describe drawing in the output shaft:





The following tools are required to fit the output shaft in the drive flange, see graphic for arrangement:

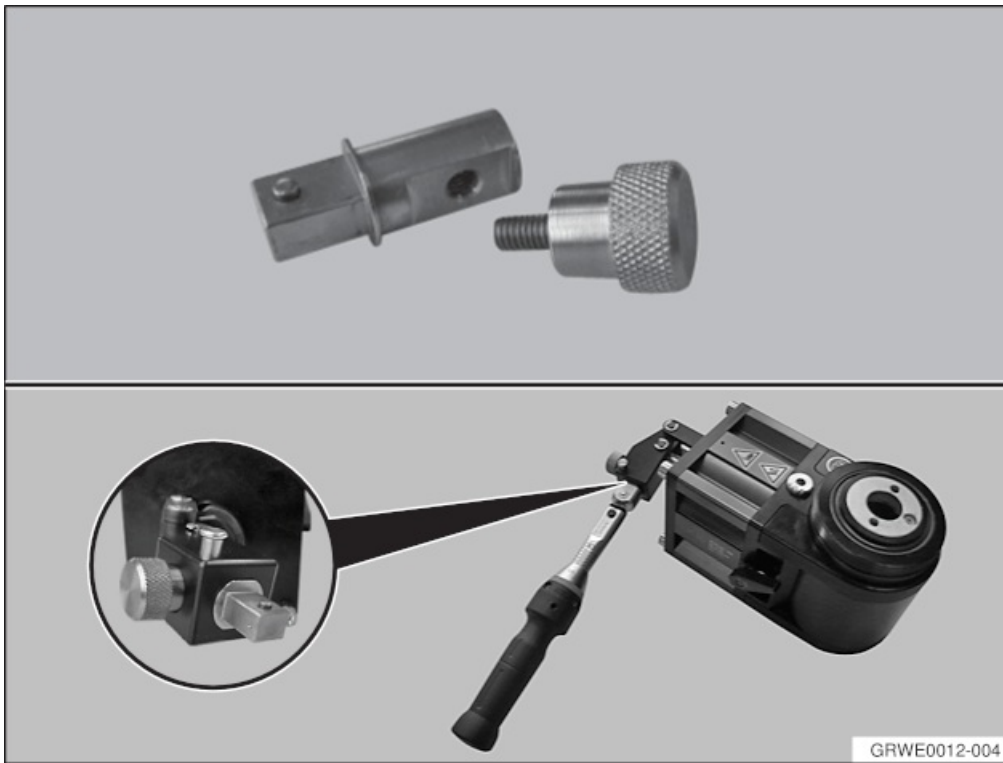
Vehicle components:

I	Drive flange hub
II	Wheel carrier/swivel bearing
III	Output shaft

Required special tool components:

1	Hydraulic unit
E1	Holding sleeve M24
D1	Washer
F2	Spindle M24 / M20 (length 335 mm)
G4	Adapter M22 x 1.5 to M20
	Adapter for torque wrench





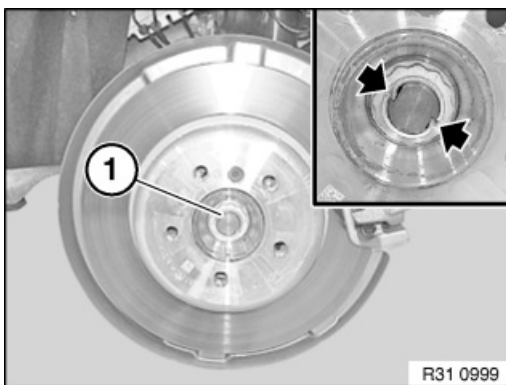
Important! Risk of damage!

The G4 special tool sleeve used has relatively thin walls due to its technical requirements. So that the load limits of the clamping sleeve are not exceeded when pulling in the output shaft, the adapter 81 64 2 318 661 must be used together with a torque wrench.

Fit adapter with torque wrench to hydraulic unit (see graphic).

Set torque wrench to 20 Nm.

Draw in output shaft with hydraulic tool until the torque wrench is activated.



Operate parking brake and tighten new collar nut (1).

Tightening torque 33 41 2AZ.

Installation note:

Renew collar nut (1), lightly oil collar nut/wheel bearing contact surface only and tighten.

No oil permitted on thread of shaft journal or collar nut.

Secure collar nut (1) by positive peening at flat areas of output shaft.





Note:

The subsequent procedure is in the document "Removing and installing/replacing output shaft on left".



**Special tools required:**

- 11 8 310
- 32 1 260
- 31 5 200

**Necessary preliminary work:**

- Remove output shaft.

**Important!**

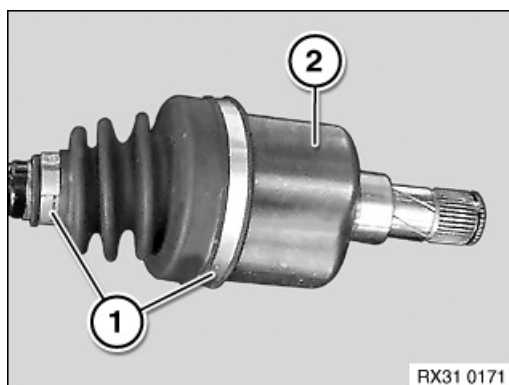
Repair should only be carried out via the inner joint! Do not press off or disassemble wheel-side joint.

The transmission-side joint may be bent by max. 18° and the wheel-side joint by max. 45°!

Remove all traces of old grease from inner joint, wipe out outer joint!

Only use dry, clean cloth free of grease and lint for cleaning!

Visible soiling of joints (e.g. by water or dirt) will cause premature failure!

**Important!**

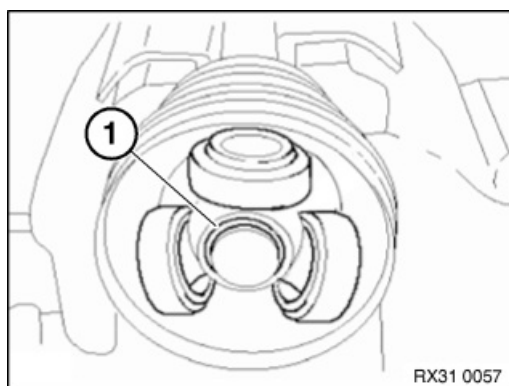
Always use plastic protective jaws when working with a vice.

Used tensioning strap must not be re-used!

Clean output shaft and grip in vice.

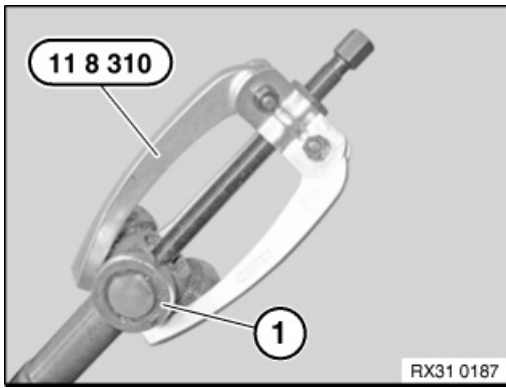
Release tensioning strap (1).

Detach housing (2) and clean carefully.

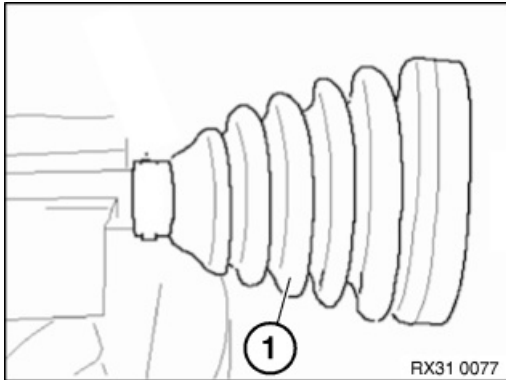


Remove circlip (1).





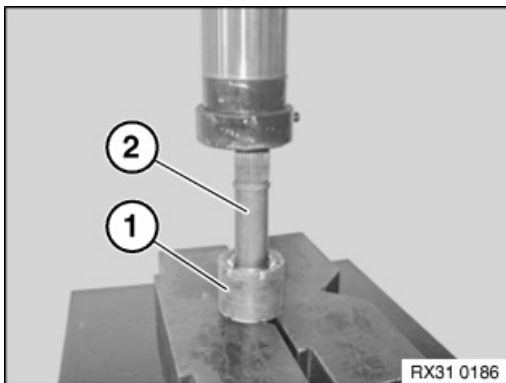
Pull tripod star (1) off output shaft with special tool 11 8 310 and clean carefully.



Important!

Remove all traces of old grease. Old gaiter must not be reused!

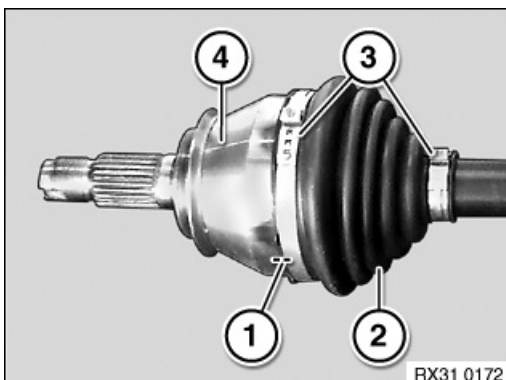
Detach gaiter (1) of joint on transmission side and carefully clean output shaft.



Press vibration absorber (1), if fitted, off output shaft (2) with press.

Vibration absorber must not be reused.

Replace vibration absorber -> Refer to subsequent procedure.



Removing outer joint gaiter:

Important!

The wheel-side constant velocity joint is pressed on and secured with a snap ring. Do not press off or disassemble!

Failure to comply with this instruction will result in the constant velocity joint being damaged.

Mark axial position (1) of gaiter (2) to wheel-side joint (4).

Release tensioning strap (3).

Detach gaiter (2) of joint on wheel side.

Wipe accessible areas of joint (4) with a clean and lint-free cloth.



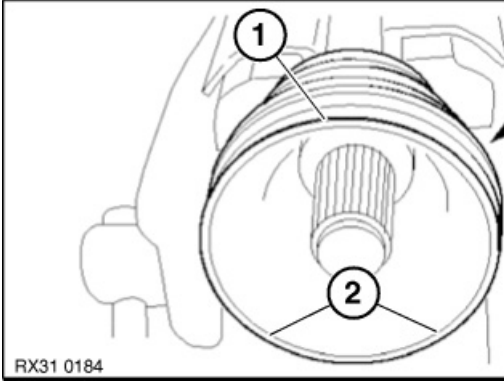


Installing outer joint gaiter: Important!

Use only quantity of grease provided.

The joint on the wheel side must not be packed with more than 70 g of grease.

During assembly, the sealing surfaces on the gaiter and joint must be clean, dry and free of grease!



Slide new gaiter (1) onto output shaft and fill with lubricating grease from repair kit.

Note:

The sealing surfaces (2) inside the gaiter and the groove on the constant velocity joint must be dry, clean and free of grease.

Push packed gaiter together with infinitely variable jubilee clip on to joint on wheel side.

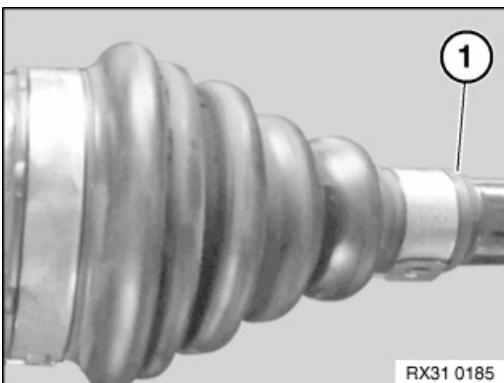
Ensure the gaiter snaps into the groove in the joint and is aligned with the axial marks.

Position a new infinitely variable jubilee clip in the groove for the gaiter and close with special tool 32 1 260 .

Due to the material thickness, an increased closing force is required!

Note:

The diameters of the stepless ear clips are marked on the components!

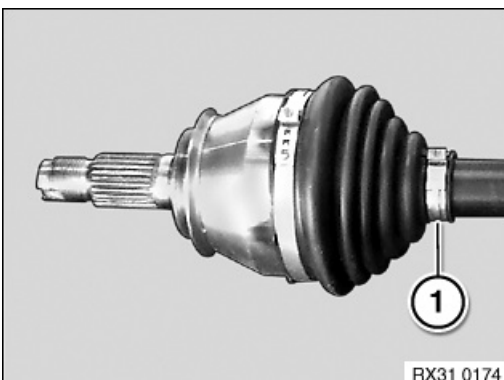


Important!

Gaiter must be bled after fitting in order to adapt the excess pressure generated during fitting to the ambient pressure!

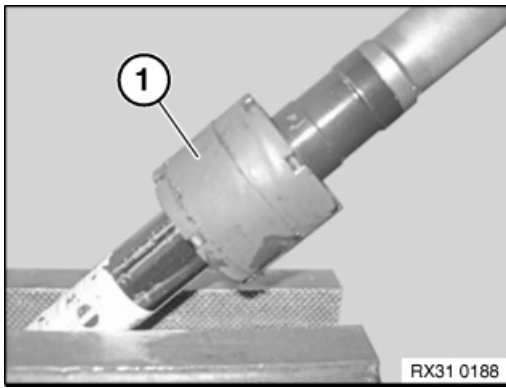
Slide gaiter up to visible groove (1).

Bleed gaiter; carefully slide a suitable tool between gaiter and output shaft for this purpose.



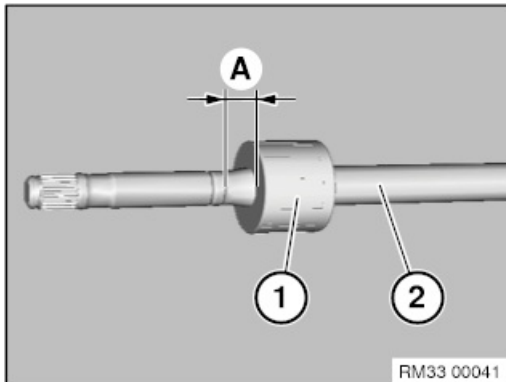
Close new infinitely variable jubilee clip (1) with special tool 32 1 260 .





Pressing on vibration absorber:

Grip output shaft in vice and push vibration absorber (1) by hand onto output shaft.

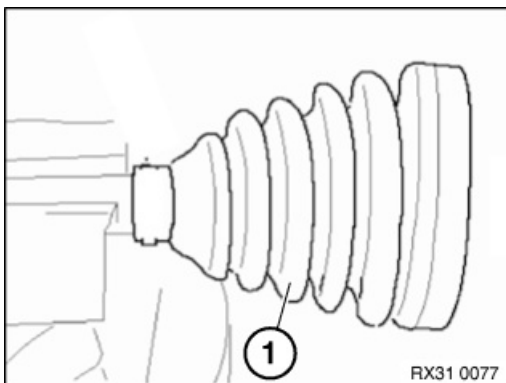


Align vibration absorber (1) to distance (A) = 19 mm from control groove on output shaft (2).

Installation note:

Labelling on vibration absorber (1) faces vehicle exterior.

The control groove is still visible after the gaiter is mounted.

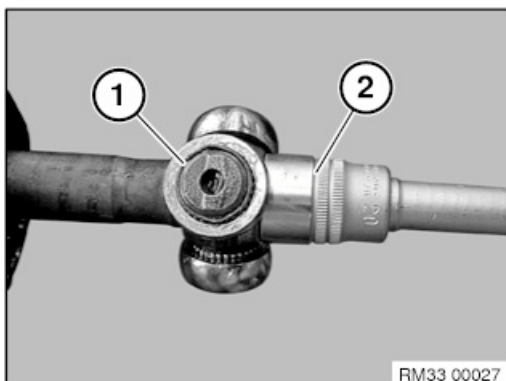


Installing inner joint gaiter:

Slide new gaiter (1) together with infinitely variable jubilee clip and retaining clip on to output shaft.

Installation note:

Push gaiter of joint on transmission side up to limit position of vibration absorber.

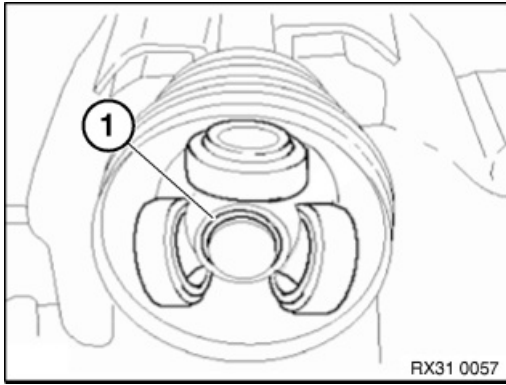


Important!

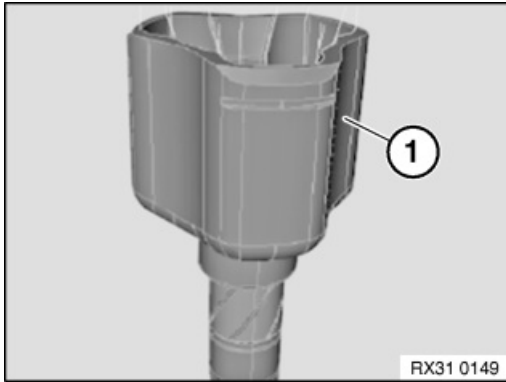
Align tripod star such that the bevels face towards the output shaft!

Drive tripod star with a suitable tool (1) onto output shaft until groove for snap ring is exposed.





Install circlip (1).

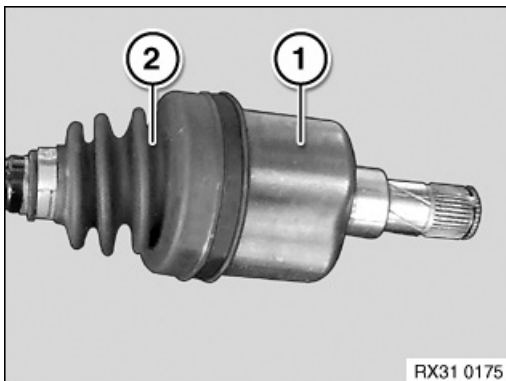


Important!

Use only quantity of grease provided.

Packing of grease in the transmission-side joint must not exceed 108.5 g.

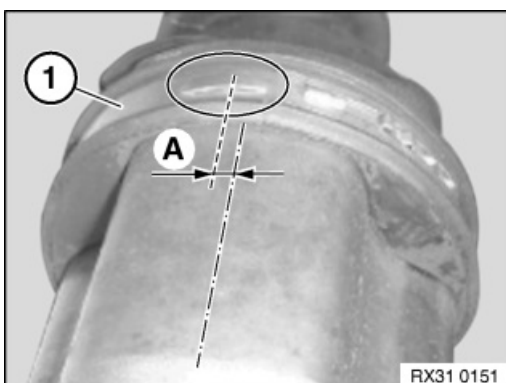
Pack lubricating grease into housing (1).



Important!

During assembly, the sealing surfaces on the gaiter and joint must be clean, dry and free of grease!

Attach packed housing (1) to tripod star and into gaiter (2). *Note:* Make sure gaiter is correctly seated in groove in housing.



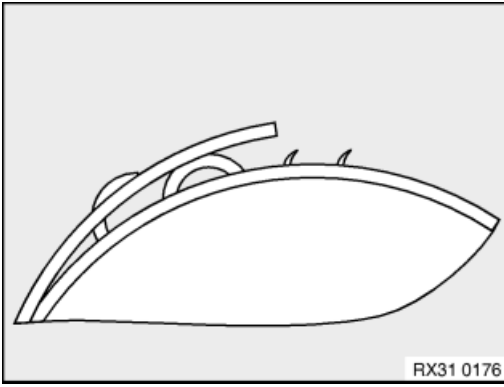
Important!

The centre point of clip must be level with the centre line of the housing!

Max. deviation (A) ± 10 mm

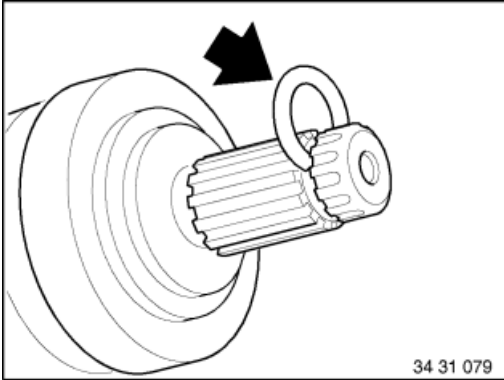
Close new infinitely variable retaining clip with special tool 31 5 200 .





Important!

The stepless clamp must snap into place completely with both hooks! Both hooks must no longer be visible after engagement.



Important!

The circlip must be renewed!



Completely remove and install the rear axle support (all-wheel



Special tools required:

- 31 5 255
- 31 5 251
- 00 2 030
- 33 5 206



Warning!

Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.

Load the luggage compartment with a minimum of 100 kg before lowering/removing the rear axle support.

When supporting components, make sure that:

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the vehicle hoist.



Important!

Observe safety instructions for raising the vehicle

In order to avoid damage to vehicle hoist, perform weight compensation on vehicle.



Note:

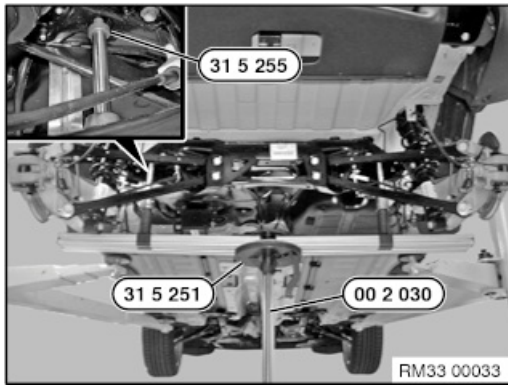
If the wishbone is detached from the rear axle support / trailing arm, it is necessary after reinstallation to carry out a chassis / wheel alignment check.



Necessary preliminary tasks:

- Remove rear wheels.
- Remove rear axle final drive.
- Detach Bowden cables for parking brake at rear axle support.





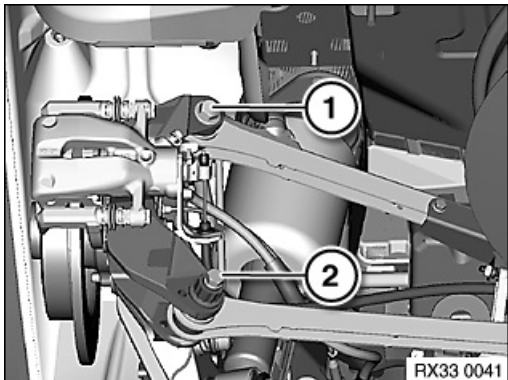
The jacking points on the left side are shown.

Align special tools 31 5 255 , 31 5 251 with the rear axle support.
Support rear axle support by operating workshop jack 00 2 030 .

Important!

The centre of gravity of the rear axle must be positioned centrally over the workshop jack.

Use tensioning strap 33 5 206 to tie the rear axle support to special tool 31 5 251 .



Support trailing arm from underneath using a workshop jack.

Release screws (1).

Tightening torque 33 32 1AZ.

Installation note:

Replace self-locking nut.

Tighten in normal position.

Mark position of eccentric adjustment washer to trailing arm to simplify subsequent adjustment of rear axle.

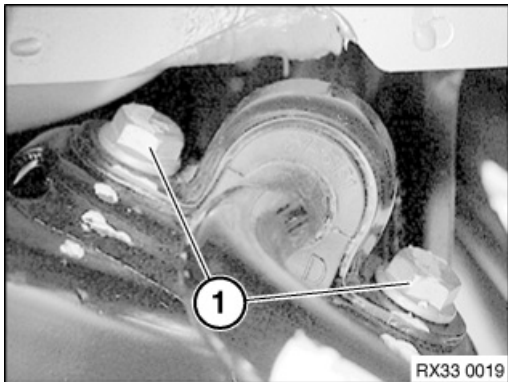
Release screw (2).

Tightening torque 33 32 2AZ.

Installation note:

Refit eccentric adjustment washer.

Tighten in normal position.



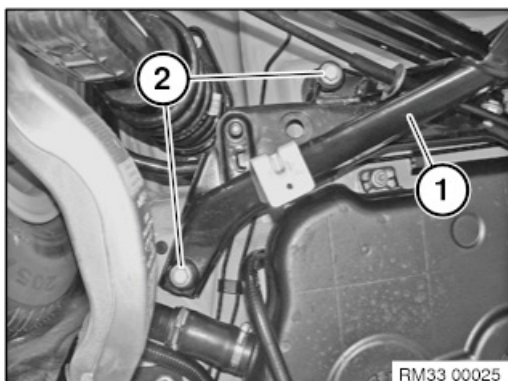
Release left and right screws (1).

Tightening torque 33 55 3AZ

Secure stabiliser against falling out.

Installation note:

Keep rubber mount and stabilizer clean and free from oil and grease .



Release screws (2) at rear axle support (1). (right-hand side is identical).

Tightening torque 33 31 1AZ.

Lower rear axle support.

Installation note:

Check threads for damage ; if necessary , repair with Helicoil thread inserts.





After installation:

- Perform wheel alignment.



**Special tools required:**

- 31 5 251
- 00 2 030
- 31 5 255
- 31 5 253
- 33 5 206

**Warning!**

Danger of injury!

Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.

Load the luggage compartment with a minimum of 100 kg before lowering/removing the rear axle support. This prevents the vehicle from tilting or sliding off the vehicle hoist!

When supporting components, make sure that:

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the vehicle hoist.

**Important!**

Before lowering/removing rear axle support:

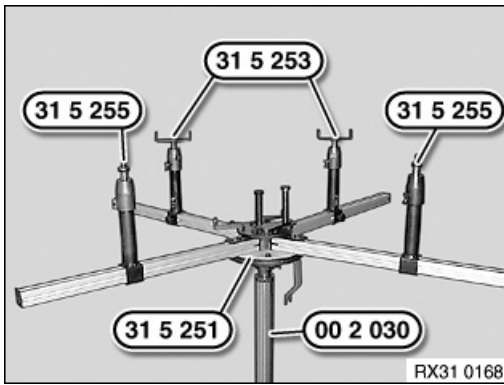
Observe safety instructions for raising the vehicle

In order to avoid damage to vehicle hoist, perform weight compensation on vehicle.

**Necessary preliminary tasks:**

- Remove complete exhaust system with heat shield at centre.
- Remove underbody cover at right and left.





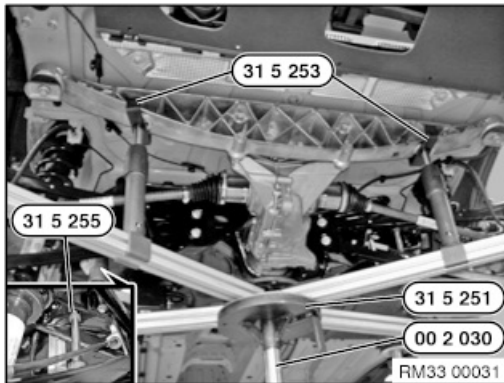
Engage special tool 31 5 251 with a 2nd person helping completely on workshop jack 00 2 030 .

Insert special tools 31 5 255 in telescopic supports of a profile rail pair.

Insert special tools 31 5 253 in telescopic supports of other profile rail pair.

Note:

In a profile rail pair, two profile rails are connected to one another by gearing.



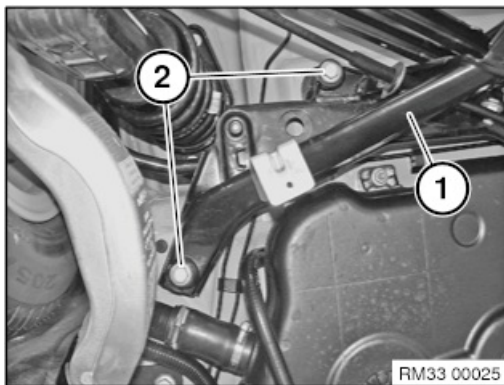
The jacking points on the left side are shown.

Align special tools 31 5 255 31 5 253 and 31 5 251 to rear axle support. Support rear axle support by operating workshop jack 00 2 030 .

Important!

The centre of gravity of the rear axle must be positioned centrally over the workshop jack.

Tie down rear axle support 33 5 206 to the special tool using a tensioning strap 31 5 251 !

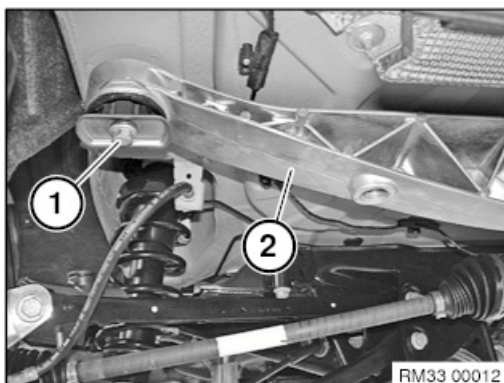


Release screws (2) at rear axle support (1). (right-hand side is identical).

Tightening torque 33 31 1AZ.

Installation note:

Check threads for damage; if necessary, repair with Helicoil thread inserts.



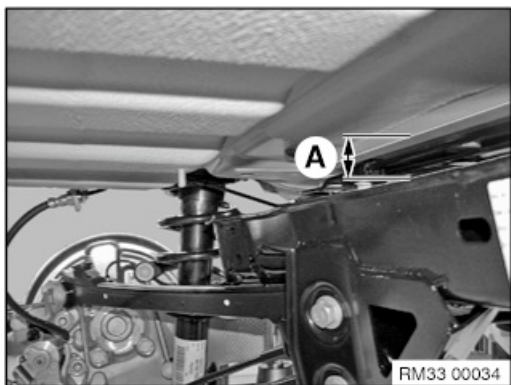
Undo screw (1) on the cross member (2). (right-hand side is identical).

Tightening torque 33 31 2AZ.

Installation note:

Check threads for damage; if necessary, repair with Helicoil thread inserts.





Lower rear axle support by max. $A = 40$ mm.

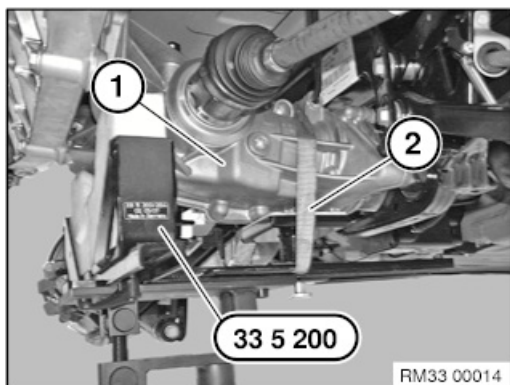


**Special tools required:**

- 33 5 200

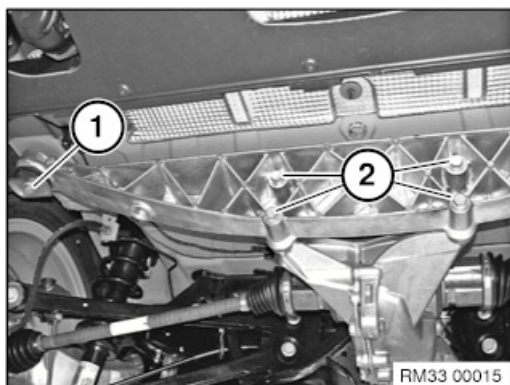
**Necessary preliminary tasks:**

- Remove exhaust system.



Support rear axle final drive (1) with workshop jack and special tool 33 5 200 .

Secure rear axle final drive against falling out with tensioning strap (2).



Release screw (1). (right-hand side is identical).

Tightening torque 33 31 2AZ.

Unfasten screws (2).

Tightening torque 33 31 3AZ.

Remove cross member.

**Replacement:**

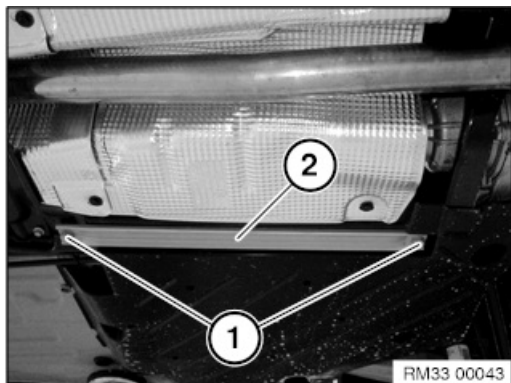
- Convert vibration absorber and replace if necessary. (N47T only)



**Important!**

Observe safety informations for raising the vehicle!

Driving without the reinforcement bar is not permitted!



Release screws (1).

Tightening torque 33 31 4AZ

Remove strut (2).

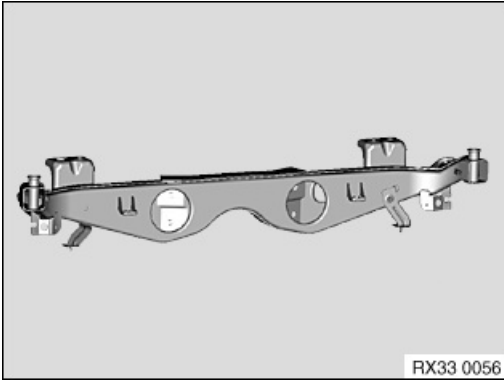


33 31 011 Replacing rear axle support



Necessary preliminary tasks:

- Remove rear axle support.
- Press in rubber mount for rear axle differential



Graphic: R56, R55 *Installation note:*

Use previous rear axle support as a template for modifying or replacing small parts.

Release wishbone at top left and right at the rear axle support.

Release wishbone at bottom left and right at rear axle support.



After installation:

- Perform wheel alignment.



*Note:*

The subsequent procedure is described in the document "Removing and installing/replacing top left wishbone".



33 32 000 Removing and installing complete front left or right trailing arms (all-wheel drive vehicles)



Necessary preliminary work:

- Remove brake disc.
- Disconnect pulse sensor.
- Only on right side: Remove line for brake pad wear sensor from trailing arm.
- Remove anti-roll bar link from trailing arm.
- Remove output shaft.



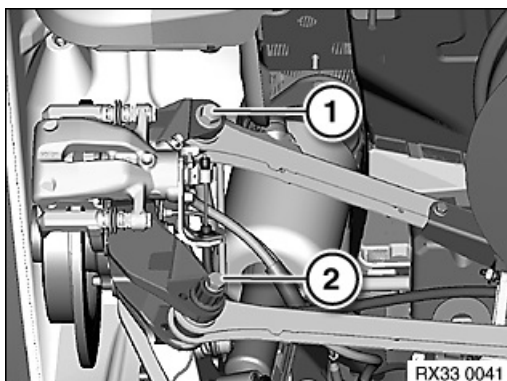
Warning!

Danger of injury!

Failure to comply with the following instructions may result in the vehicle slipping off the vehicle hoist and critically injuring other persons.

When supporting components, make sure that

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the vehicle hoist



Support trailing arm from underneath using a workshop jack.

Release nut and remove screws (1).

Installation note:

Replace self-locking nut.

Tightening torque 33 32 1AZ.

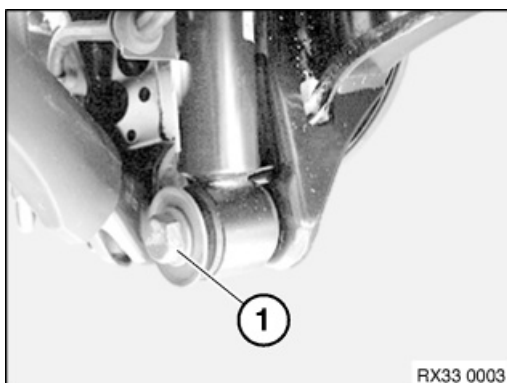
Mark position of eccentric adjustment washer to trailing arm to simplify subsequent adjustment of rear axle.

Release screw (2).

Installation note:

Refit eccentric adjustment washer.

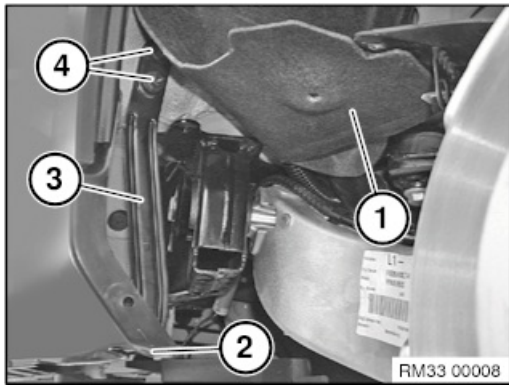
Tightening torque 33 32 2AZ.



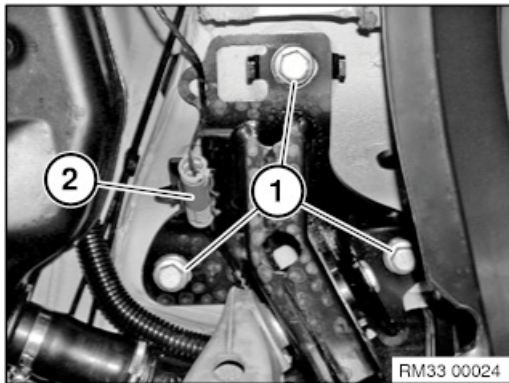
Release screw (1). *Installation note:*

Tightening torque, 33 52 1AZ.





Partially release wheel arch panel (1) and fold aside.
Release expanding rivet (2) at sill.
Release screws (4) and remove strut (3).



Mark position of trailing arm bracket to body to simplify subsequent adjustment of rear axle.

Release screws (1) and remove trailing arm with bracket.

Installation note:

Tightening torque 33 32 5AZ.



After installation:

- Perform wheel alignment check

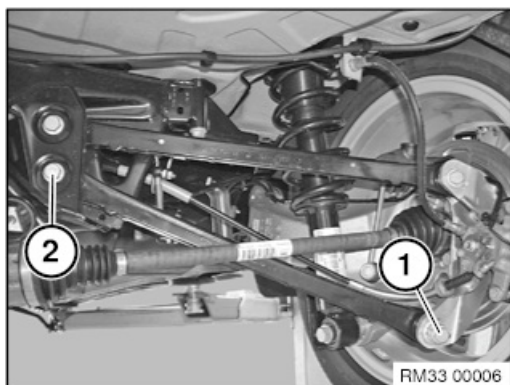


**Note:**

If the wishbone is detached from the rear axle support / trailing arm, it is necessary after reinstallation to carry out a chassis / wheel alignment check.

**Necessary preliminary work:**

- Remove vehicle underbody cover on left (or right).



Mark position of eccentric adjustment washer to trailing arm to simplify subsequent adjustment of rear axle.

Release nut and remove screw (1).

Tightening torque 33 32 2AZ.

Installation note:

Refit eccentric adjustment washer.

Tighten down screw connection in normal position.

Release nut and remove screw (2).

Tightening torque 33 32 3AZ.

Take off wishbone.

Installation note:

Replace self-locking nuts.

Tighten down screw connection in normal position.

**After Installation note:**

- Perform wheel alignment check



*Note:*

The subsequent procedure is described in the document "Removing and installing/replacing lower left wishbone".

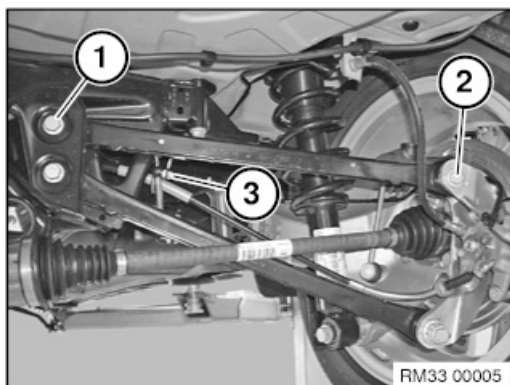


**Note:**

If the wishbone is detached from the rear axle support, it is necessary after reinstallation to carry out a chassis / wheel alignment check.

**Necessary preliminary work:**

- Remove vehicle underbody cover on left (or right).



Only on right with ride height sensor: Unscrew nut (3).

Installation note:

Tightening torque 37 14 4AZ.

Release nut and remove screw (1).

Tightening torque 33 32 3AZ.

Installation note:

Replace self-locking nut.

Tighten down screw connection in normal position.

Release nut and remove screw (2).

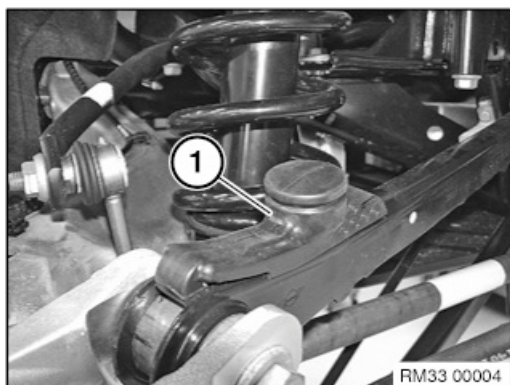
Tightening torque 33 32 1AZ.

Take off wishbone.

Installation note:

Replace self-locking nut.

Tighten down screw connection in normal position.

**Replacement:**

- Modify stop pad (1).

**After Installation note:**

- Perform wheel alignment check



*Installation note:*

1. All screws, nuts, bolts and hose clamps removed during the repair must be replaced.
2. Retaining elements on chassis and suspension and steering parts must be replaced.

*Note:*

Rubber mount is integrated in trailing arm holder and cannot be changed separately.

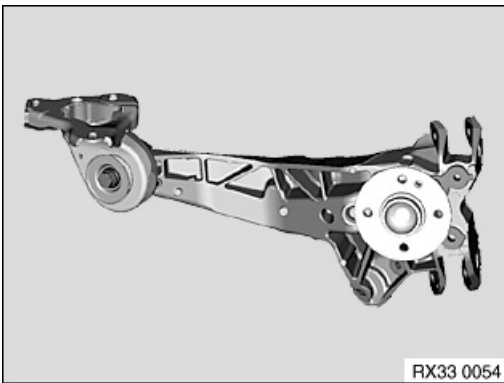


**Note:**

Replace self-tapping screw for mounting bracket (with rubber mount) on trailing arm.

**Necessary preliminary tasks:**

- Remove trailing arm.
- Remove pulse sensor with line.
- R60ALL, R61ALL: Output shaft must be removed.



Modify wheel bearing

Modify trailing arm bracket

**After installation:**

- Perform wheel alignment.



**Necessary preliminary work:**

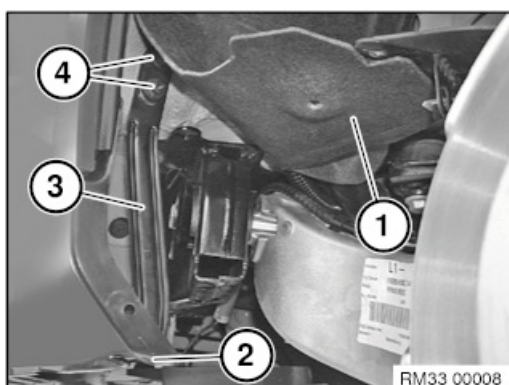
- Remove rear wheel.

**Important!**

When replacing trailing arm:

Replace self-tapping screw.

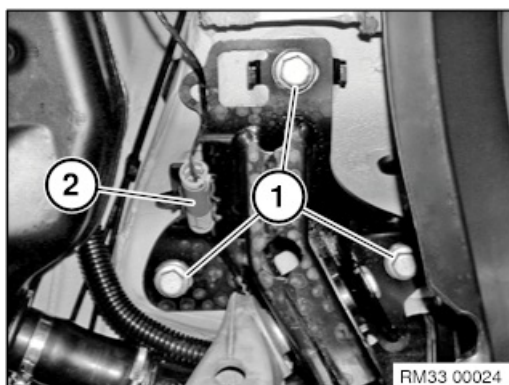
Before installing the trailing arm, tap a thread in the trailing arm with the new screw.



Partially release wheel arch panel (1) and fold aside.

Release expanding rivet (2) at sill.

Release screws (4) and remove strut (3).



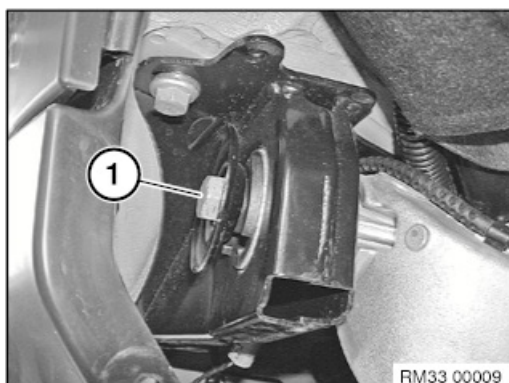
Mark position of trailing arm bracket to body to simplify subsequent adjustment of rear axle.

Support trailing arm from underneath using a workshop jack.

Release screws (1), disconnect connector (2) and remove trailing arm with holder.

Installation note:

Tightening torque 33 32 5AZ.



Release screw (1) and remove holder (2). *Installation note:*

Tightening torque 33 32 4AZ

Tighten down screw in normal position.





After installation:

- Perform wheel alignment.

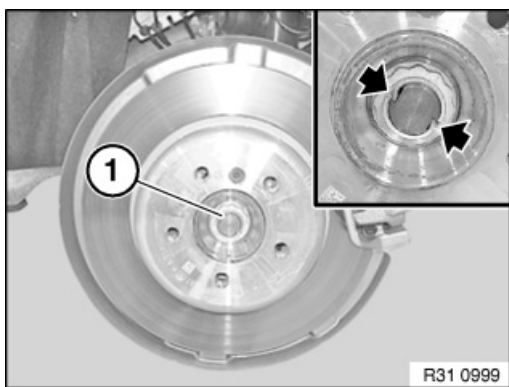


**Special tools required:**

- 81 64 2 155 744
- 81 64 2 294 517
- 81 64 2 318 661
- 2 318 661

**Necessary preliminary work:**

- Remove rear wheel.

**Important!**

Expand anti-twist lock sufficiently to avoid damaging thread when releasing collar nut (1).

Activate parking brake and release collar nut (1).

Tightening torque 33 41 2AZ.

Installation note:

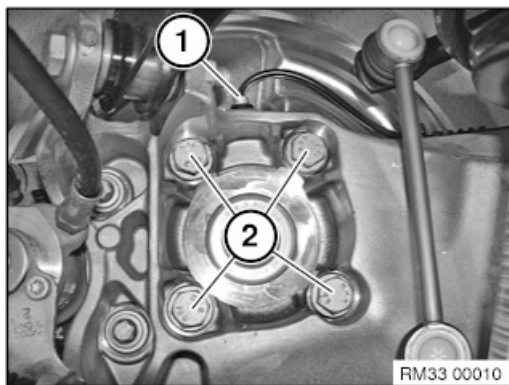
Replace collar nut, oil collar nut/wheel bearing contact surface only and tighten down.

No oil permitted on thread of shaft journal or collar nut.

Secure collar nut on flattened area (2) of output shaft by positive caulking.



Remove brake disc.



(For more simple schematic diagram: graphic without output shaft.)

Release screw (1) and remove pulse sensor.

Tightening torque 34 51 4AZ.

Unfasten screws (2).

Tightening torque 33 41 1AZ. (Apply crosswise)

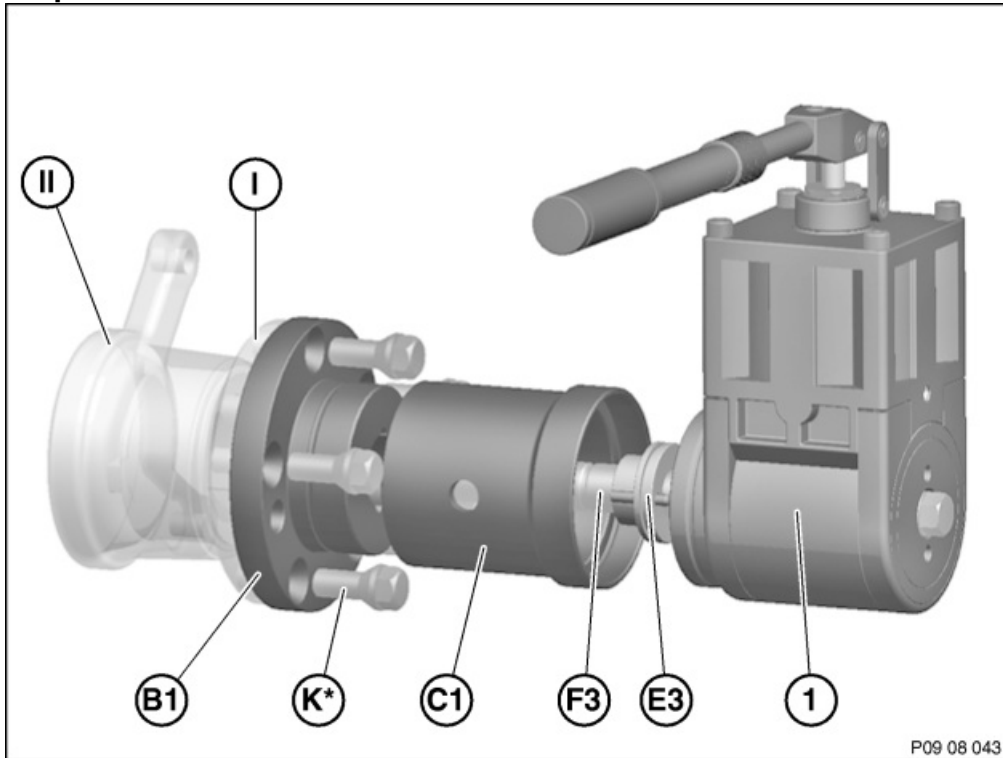




Use **special tool** , see **BMW Workshop Catalogue**.

- Hydraulic unit - 81 64 2 155 744
- Adapter kit - 81 64 2 294 517
- Adapter for torque wrench - 81 64 2 318 661

The following operations describe the procedure for pulling the wheel bearing/wheel hub off the output shaft:



The following tools are required to pull the wheel bearing/wheel hub off the output shaft; see graphic for arrangement:

Vehicle components:

I	Drive flange hub
II	Wheel carrier/swivel bearing

Required special tool components:

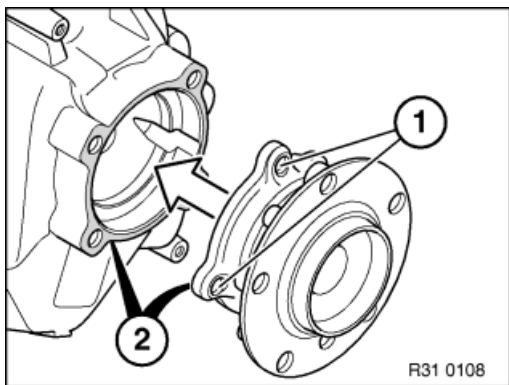
1	Hydraulic unit
E3	Washer M24
F3	Spindle M24 (length 270 mm)
C1	Holding sleeve
K2	Screws M14 x 1.5
B1	Adapter

Pull wheel bearing off the output shaft using the hydraulic tool.

Important!

Secure wheel bearing with flange-mounted special tool to prevent it from falling.

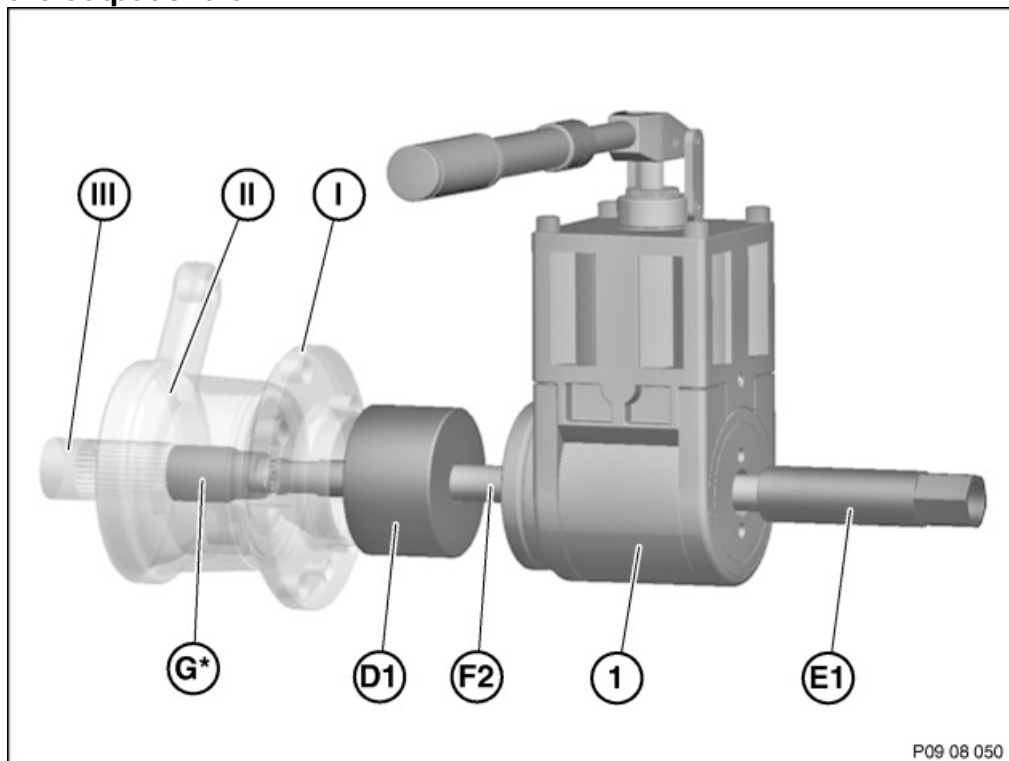




Installation note:

- Keep contact surface (2) of wheel bearing and trailing arm clean and free from grease.

The following operations describe the procedure for pulling the wheel bearing/wheel hub onto the output shaft:



The following tools are required to pull the wheel bearing/wheel hub onto the output shaft; see graphic for arrangement:

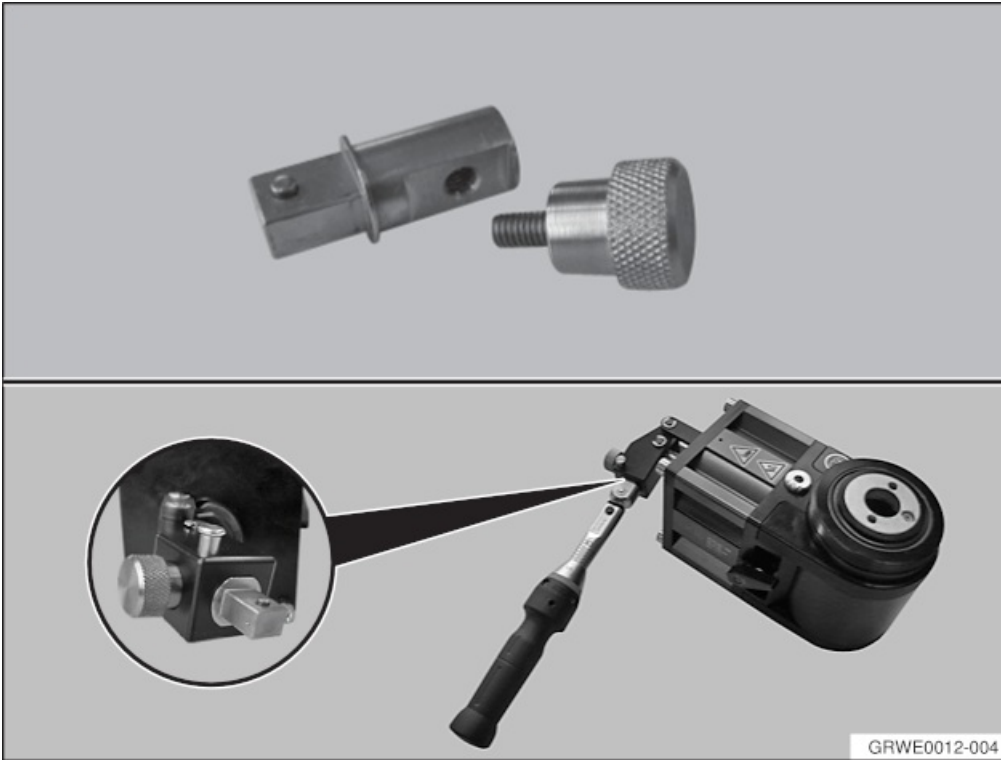
Vehicle components:

I	Drive flange hub
II	Wheel carrier/swivel bearing
III	Output shaft

Required special tool components:

1	Hydraulic unit
E1	Holding sleeve M24
D1	Washer
F2	Spindle M24 / M20 (length 335 mm)
G4	Adapter M22 x 1.5 to M20
	Adapter for torque wrench





Important! Risk of damage!

The G4 special tool sleeve used has relatively thin walls due to its technical requirements. So that the load limits of the clamping sleeve are not exceeded when pulling in the output shaft, you **must** use the adapter 2 318 661 together with a torque wrench.

Fit adapter with torque wrench to hydraulic unit (see graphic).

Set torque wrench to 20 Nm.

Pull wheel bearing/wheel hub onto output shaft with hydraulic tool until the torque wrench is triggered.



33 00 ... Information on replacing shock absorbers

Situation:

When a shock absorber is faulty on one side (leaking, noises, limit values exceeded on the shock tester), often both shock absorbers on the axle in question are replaced.

Effect:

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as defective parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure:

If one shock absorber is damaged, it is only necessary to replace both shock absorbers when the car has driven in excess of 80 000 km.





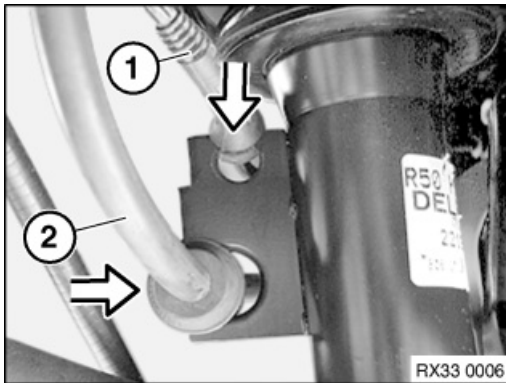
Note:

Replacing the spring strut shock absorber is described in Removing and installing/replacing rear shock absorber.



Necessary preliminary tasks:

- Remove rear wheel.

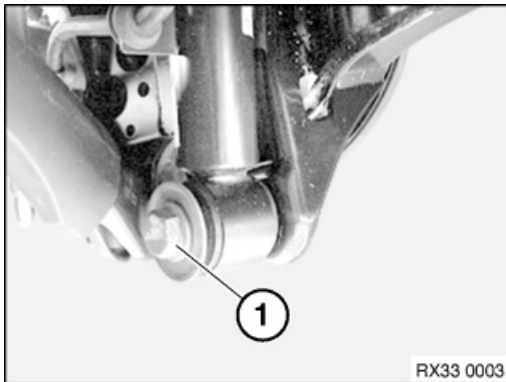


only: R55, R56, R57, R58, R59

Remove cable for pulse sensor (1) and brake hose (2) from spring strut.

Installation note:

Make sure rubber grommets are correctly seated.



Support trailing arm from underneath using a workshop jack.

Important!

Secure spring strut against falling out.

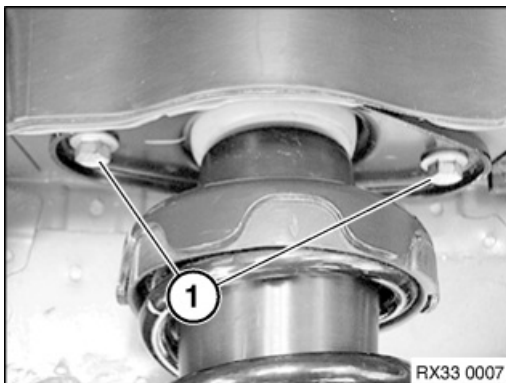
Release screw (1).

Tightening torque 33 52 1AZ.

Installation note:

Blow out metal chips in thread of trailing arm with compressed air (caused when fitting self-tapping screw for the first time).

R60, R61: Renew screw.



Release screws (1) and remove spring strut.

Tightening torque 33 52 2AZ.

Installation note:

Replace screws.





Installation note:

- Secure upper spring strut in body.
- Turn shock absorber to align trailing arm.



Removing and installing/replacing rear left or right shock



Special tools required:

- 31 3 340
- 31 3 341
- 31 3 357



Important!

- When replacing shock absorber/spring strut, renew auxiliary damper!



Warning!

Before using the special tool 31 3 340 take care to read through the Owner's Handbook!

All the safety precautions and instructions contained in the Owner's Handbook must be strictly observed!

Failure to observe these safety information and instructions increases the risk of serious physical injury, damage to your health and damage to property and equipment!



Important!

1. Prior to each use, check the special tools for defects, modifications and operational reliability.
2. Damaged/modified special tools must not be used!
3. No changes or modifications may be made to the special tools!
4. These special tools are intended solely for the purpose of tightening and relieving cylindrical and tapered suspension springs.
5. Keep special tools dry, clean and (down to the spindle) free from grease.
6. Impact screwdrivers are prohibited!
7. Do not compress coil spring to full extent.



Installation note:

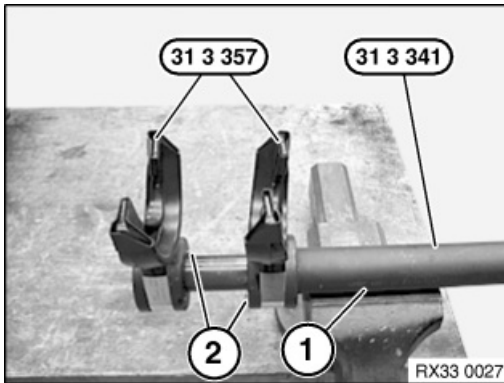
1. All screws, nuts, bolts and hose clamps removed during the repair must be replaced.
2. Retaining elements on chassis and suspension and steering parts must be replaced.





Necessary preliminary tasks:

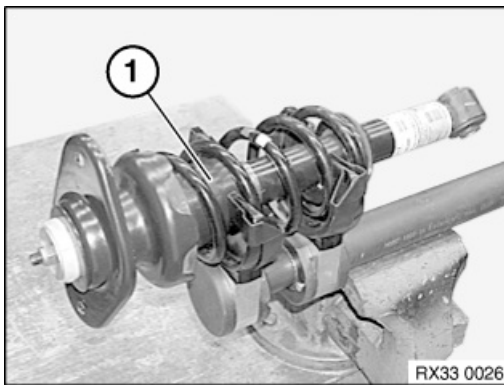
- Remove rear spring strut shock absorber unit.



Clamp special tool 31 3 341 to guide (1) in vice.

Fit special tools 31 3 357 from above on special tool 31 3 341 until retaining bolts (2) can be felt and heard to snap into place.

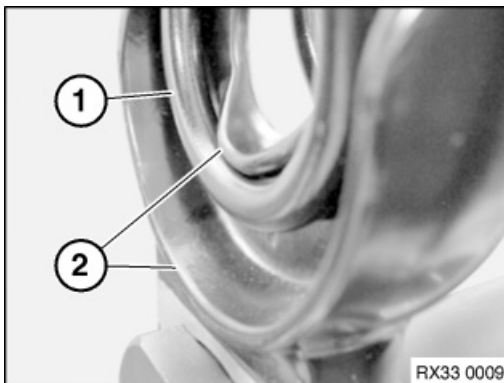
Check seating of special tools 31 3 357 and, if necessary, correct.



Important!

Do not damage protective tube (1).

Clean coil spring to remove all coarse dirt and mount on special tools 31 3 357 .



Important!

Coils (1) of coil spring must be located completely in recesses of special tools 31 3 357 when tensioned!

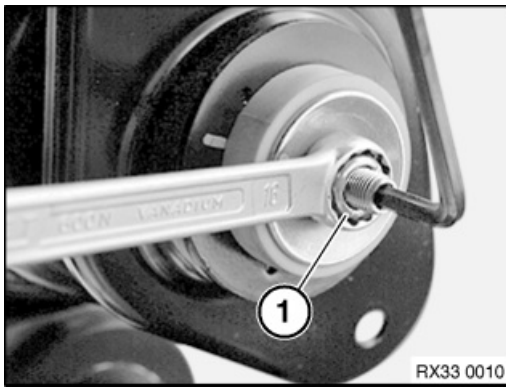
Compress coil spring until stress on piston rod is relieved.



Warning!

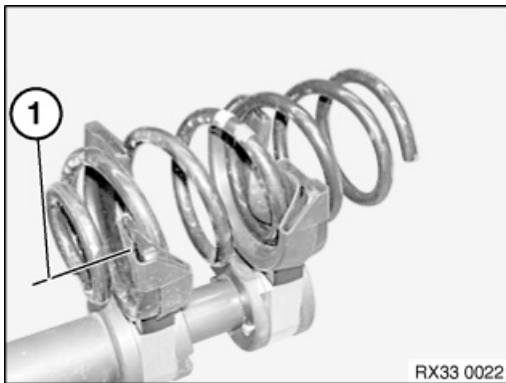
Nut may only be release when the spring coil is located completely in the recess of the special tools and the piston rod is freed of load!





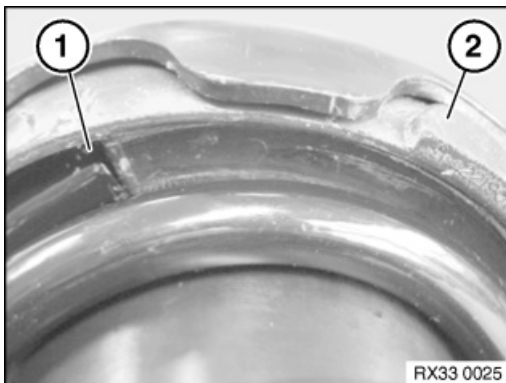
Release nut (1), gripping piston rod if necessary. *Installation note:*
Replace nut.

Tightening torque 33 52 3AZ



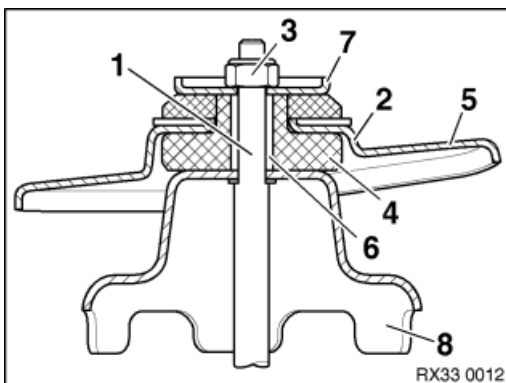
Note:

Insert coil spring in special tools so that spring end (1) with the smaller spring diameter points downwards in the middle.



Installation note:

Make sure spring end (1) contacts spring pad correctly. The positioning (2) on the spring pad must rest in the recess of the spring cup.



Installation note:

The left and right support bearings are different.

Make sure that the correct support bearing is installed on each side of the vehicle.

1. Shock absorber piston rod
2. Support bearing
3. Hexagon nut
4. Elastomer seal
5. Position of stud bolt (upper mounting to body)



6. Inner sleeve (steel insert)
7. Plate
8. Spring cup



Replacement:

- Modify or replace stone guard.





Installation note:

1. All screws, nuts, bolts and hose clamps removed during the repair must be replaced.
2. Retaining elements on chassis and suspension and steering parts must be replaced.



Note:

Procedure is described in the document "... rear left or right shock absorber".

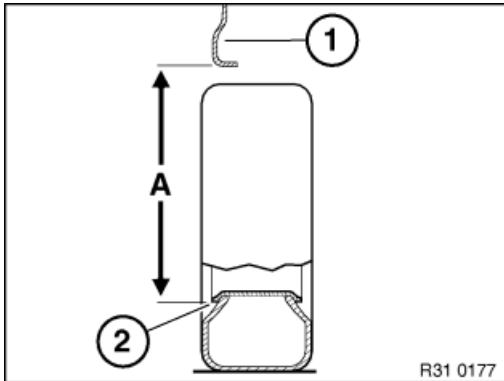


33 53 ... Measuring vehicle ride height



Necessary preliminary tasks:

- Move vehicle into normal position.



Determine actual ride height (A) - to do so, attach tape measure to rim flange (2) at bottom middle and measure to wheel arch cover (1).



*Installation note:*

1. All screws, nuts, bolts and hose clamps removed during the repair must be replaced.
2. Retaining elements on chassis and suspension and steering parts must be replaced.

**Important!**

- Both coil springs on the relevant axle must be replaced only in the event of corrosion breakage!
- The spring pads at the top and bottom must also be renewed when replacing the coil springs.

Note:

The coil spring is allocated in the Electronic Parts Catalogue (EPC) under the item "Spring table" after the vehicle identification number has been entered and the optional equipments of the car have been selected.

*Note:*

Procedure is described in the document "... rear left or right shock absorber".



**Warning!**

Danger of injury!

Failure to comply with the following instructions may result in the vehicle slipping off the vehicle hoist and critically injuring other persons.

Before lowering/removing the rear axle support, it is essential to place a minimum load of 100 kg in the luggage compartment to prevent the vehicle from toppling/slipping off the vehicle hoist!

When supporting components, make sure that:

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the vehicle hoist.

**Important!**

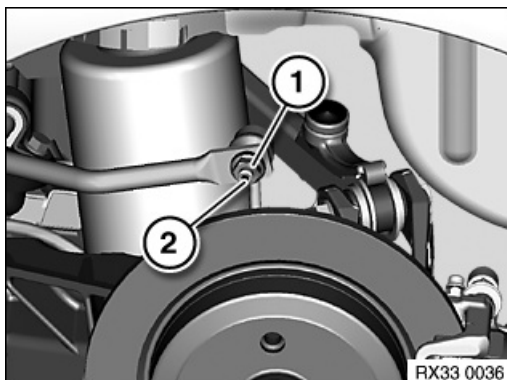
Before lowering/removing rear axle support:

Observe safety instructions for raising the vehicle

In order to avoid damage to vehicle hoist, perform weight compensation on vehicle.

**Necessary preliminary work:**

- Remove rear wheels.
- Lower rear axle support.

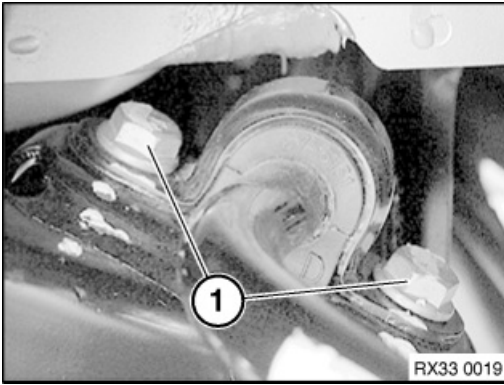


Release nut (1) on left and right; if necessary, grip hexagon socket (2) or dihedron. *Installation note:*

Replace self-locking nut.

Tightening torque 33 55 1AZ





Release left and right screws (1).

Tightening torque 33 55 3AZ

Remove retaining bracket and rubber mount on left and right.

Turn stabilizer bar and feed out sideways.

Installation note:

Keep rubber mount and stabilizer clean and free from oil and grease.

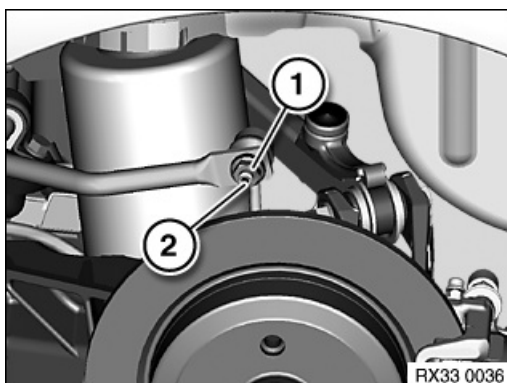


**Special tools required:**

- 31 1 140

**Necessary preliminary work:**

- Remove rear wheel

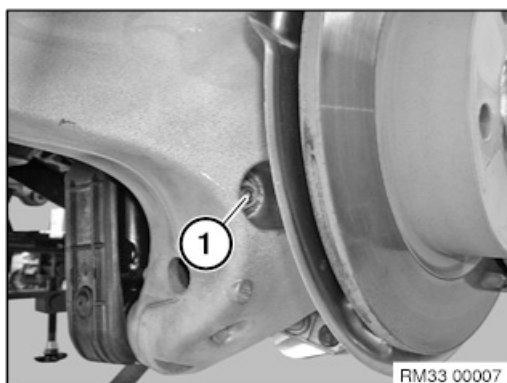


Release nut (1); if necessary, counter-hold at hexagon socket (2) or with special tool 31 1 140 .

Tightening torque 33 55 1AZ.

Installation note:

Replace self-locking nut.



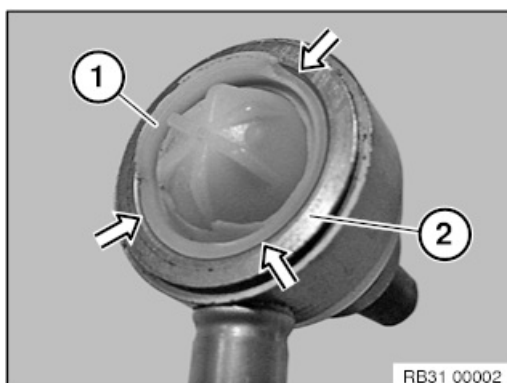
Release nut (1); if necessary, counter-hold with special tool 31 1 140 .

Tightening torque 33 55 2AZ.

Remove anti-roll bar link.

Installation note:

Replace self-locking nut.

**Important!**

Never tighten anti-roll bar link with an impact screwdriver.

Do not twist the joint of the anti-roll bar link while tightening the nut!

Never twist the joint to hold against the screw connection!

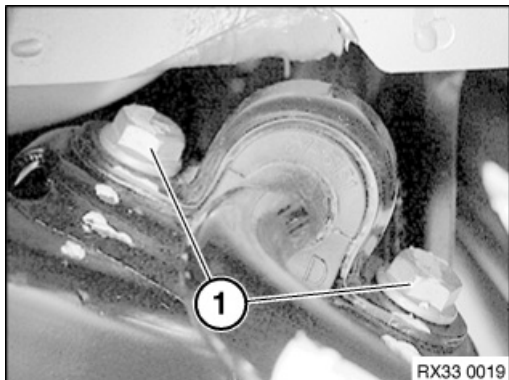
The plastic bond (1) may never be broken as marked with arrows in area (2).

If the plastic bond is broken, the anti-roll bar link must be replaced.



**Necessary preliminary work:**

- Remove rear wheels.



Release screws (1).

Remove retaining bracket from rubber mount and then remove rubber mount.

Installation note:

Rubber mounts must be installed dry.

Tightening torque 33 55 3AZ.

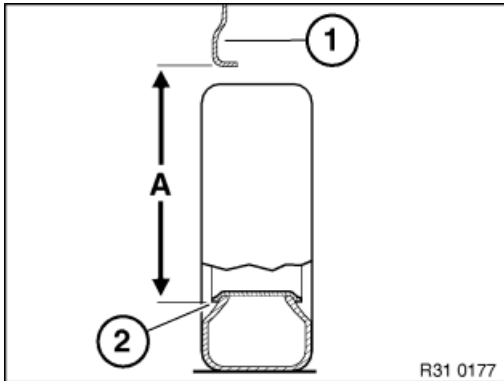


33 53 ... Measuring vehicle ride height



Necessary preliminary tasks:

- Move vehicle into normal position.



Determine actual ride height (A) - to do so, attach tape measure to rim flange (2) at bottom middle and measure to wheel arch cover (1).





Screw securing adhesive is a means of preventing a screwed connection from being loosened by external influences.

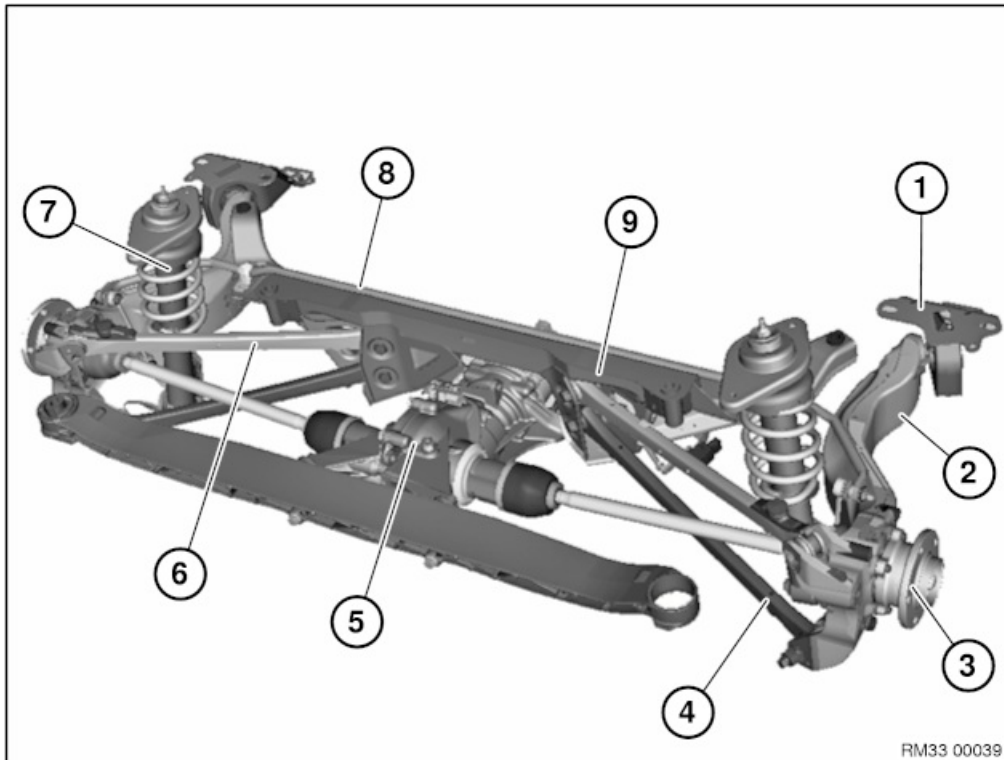
Once the screw has been coated with adhesive, the adhesive remains inactive until such time that it is activated by the encapsulation breaking when the screw is inserted and then cures (hardens) at room temperature.



Installation note:

- Screw connection must be completed within 20 mins. (start of curing)
- Microencapsulated screws must not be retightened
- Thread of nut must be cleaned beforehand in event of repeated use

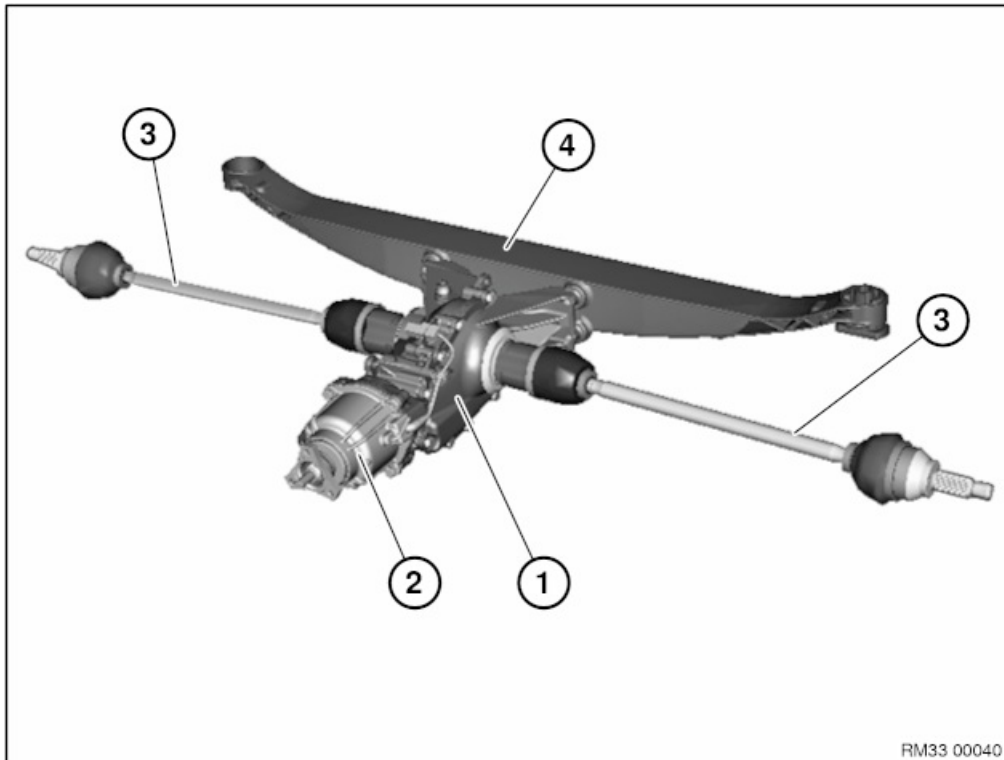




Safety precautions & general information

- | | |
|--|-----------------|
| 1 Bracket, trailing arm/rubber mount | Adjustment work |
| 2 Trailing arm | Testing |
| 3 Wheel bearing | Troubleshooting |
| 4 Lower wishbone | |
| 5 Overview of rear axle final drive/output shafts | |
| 6 Upper wishbone | |
| 7 Spring strut shock absorber. | |
| 8 Anti-roll bar / rubber mount / anti-roll bar links | |
| 9 Rear axle carrier | |





Safety instructions & general information

- 1 Rear axle final drive
- 2 Clutch
- 3 Output shafts
- 4 Cross member



33 10 ... **Rear axle final drive: Assignment to model series**

Model series	Engine	Rear axle final drive	Remarks
R60, R61	N16, N18, N47T	148AL	





Note:

This procedure is described in the section headed Bleeding brake system with DSC.



**Note:**

Read and comply with the instructions.

When replacing or repairing, observe the filling and bleeding instructions for the following parts:

- Tandem brake master cylinder
- Hydraulic unit
- Components and connecting lines which are fitted between these assemblies.

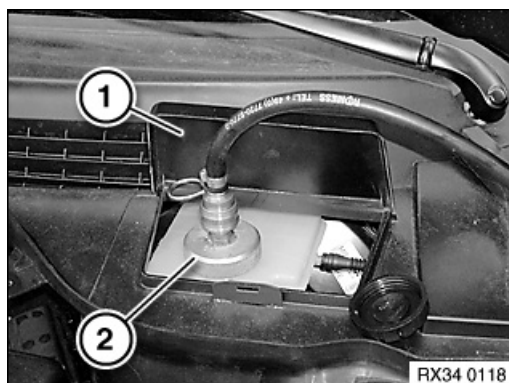
Connect bleeder unit with max. 2 bar filling pressure.

A second person is needed to help carry out this work.

Always use MINI-approved brake fluids, refer to MINI Operating Fluids.



Connect Diagnosis and Information System.



Open cover (1).

Connect bleeder unit to expansion tank (2) and switch on.

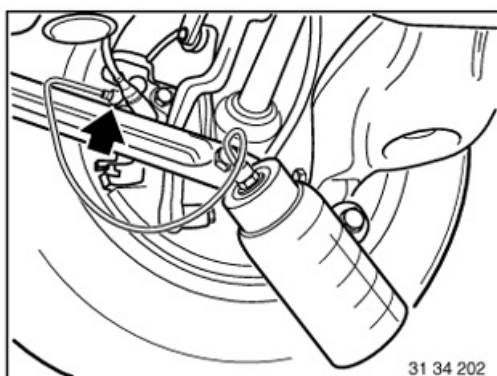
Connect DIS.

Select path: Service functions - Chassis/Suspension - Traction control systems - Bleeding procedure.

Caution!

Check relevant equipment manufacturer's operating instructions for each device.

Charging pressure should not exceed 2 bar.

**Fully rinse the brake system**

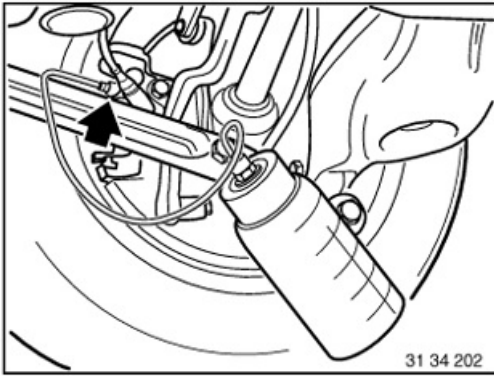
Connect bleeder hose with collecting tray to bleeder valve on rear right brake caliper.

Open bleeder valve and purge until clear, bubble-free brake fluid emerges.

Close vent valve.

Follow same procedure on rear left, front right and front left wheel brake.





Bleeding rear axle brake circuit

Connect bleeder hose with collecting tray to bleeder valve on rear right brake caliper.

Open vent valve.

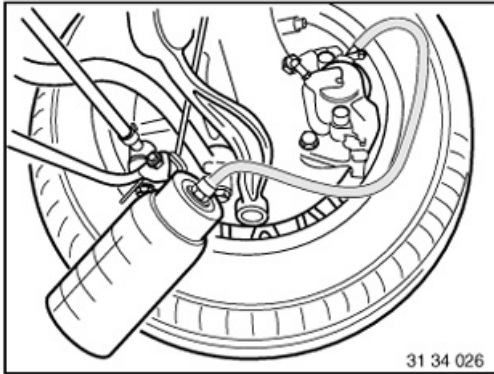
Run brake bleeding procedure with DIS with vent valve open.

After completing routine, press brake pedal 5 times to floor; clear and bubble-free brake fluid must flow out.

Close vent valve.

Tightening torque 34 00 1AZ.

Repeat procedure at rear left.



Bleeding front axle brake circuit

Connect vent hose with collecting vessel to vent valve on front right brake caliper.

Open vent valve.

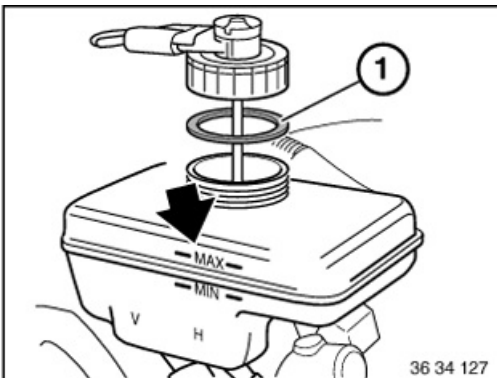
Run brake bleeding procedure with DIS with vent valve open.

After completing routine, press brake pedal 5 times to floor, clear and bubble-free brake fluid must flow out.

Close vent valve.

Tightening torque 34 00 1AZ.

Repeat procedure at front left.



Switch off bleeder unit and remove from expansion tank.

Check brake fluid level. If necessary, top up/draw off to max. level.

Close expansion tank.

Note:

Pay attention to rubber seal (1) in sealing cap.

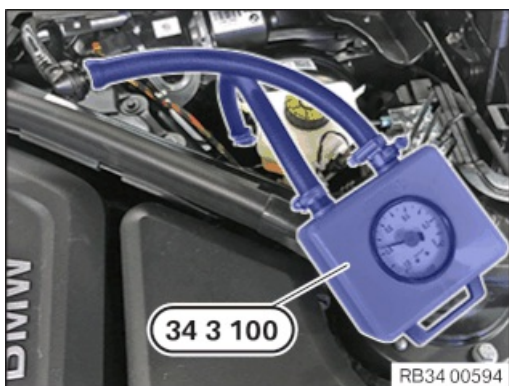


**Special tools required:**

- 34 3 100

**Necessary preliminary work:**

- If necessary, expose the brake booster



- Pull off the vacuum hose on the brake booster. Install vacuum tester 34 3 100 between the brake booster and the vacuum hose of the non-return valve.
- Start the engine.
- Check the vacuum build-up.
- Switch off engine.
- Adjust the vacuum to no more than 0.8 bar by pressing the brake pedal and wait until the value stabilises.
- If the brake pedal is not pressed, the vacuum must reduce by maximum 0.06 bar during a test period of 1 minute.

**If the required values are not reached:**

- Change the non-return valve
- Check that the sealing between the brake servo and the tandem brake master cylinder (sealing ring) is in proper condition and fits correctly.
- If necessary, check the tightness of the brake booster with a smoke tester
- If the setpoint values are not reached during the repeat check, the brake booster must be changed.



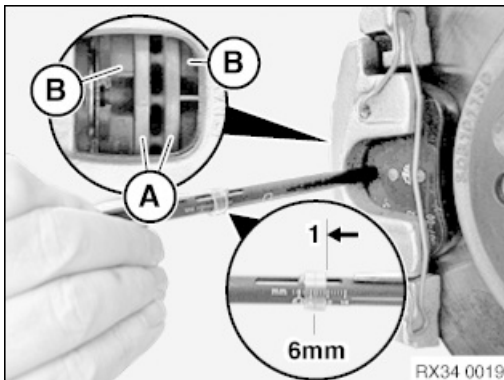
**Special tools required:**

- 34 1 260

**Note:**

The thickness of the outer brake pads can be determined without removing the wheels.

If applicable, push the vehicle until the control opening for the brake pad wear indicator (brake pad) is visible through the rim styling.



Insert special tool 34 1 260 wheel rim and into recess for the brake pad wear indicator.

Place the special tool at the brake pad, slide the ring (1) in the direction of the arrow toward the shaft and read the measured value.

In this case, a brake pad thickness of 6 mm will be measured.

Note:

(A) Brake disc

(B) brake pad

Remaining pad thickness at front brake.

Remaining pad thickness at rear brake.



34 00 ... General Information

The brake system is one of the most important safety systems on any motor vehicle. It is therefore essential to act with utmost care when working on the brake system and to follow the instructions below.

- Ensure cleanliness and only use fluff-free cleaning cloths.
- Wash away or vacuum up brake dust, do not clear it away using compressed air. This dust is a health hazard.
- Ensure that no oils or grease enter the brake system: these substances would cause complete failure of the entire brake system.
- When cleaning brake components with brake cleaner (refer to BMW Parts Department), do not allow brake cleaner to get into the brake system.
- Even the most minute traces of brake cleaner must be avoided.
- Replace brake fluid at least every two years.
- Never reuse drained brake fluid.
- Always use BMW-approved brake fluid, refer to BMW Service Operating Fluids.
- Always dispose of brake fluid in approved receptacles, refer to BMW Service Workshop Planning documentation.
- Do not allow brake fluid to drain into drain pipes, into the outside environment or into unsuitable facilities. This would create the risk of groundwater contamination since brake fluid is classed as a fluid that is hazardous to water.
- Do not allow brake fluid to come into contact with paintwork as this will destroy the paint.
- Brake fluid must not be allowed to remain on bare skin too long in order to avoid skin problems. Wash skin coated with brake fluid with water and soap.
- If brake fluid makes contact with eyes, immediately flush with large quantity of clean water and visit eye doctor.
- Brake pads:

Brake pads must be replaced when the warning threshold value of the brake pad wear indicator is reached.

Refer to Technical Data.

Brake pads must always be replaced on both sides of any axle.

The friction surfaces of the brake pads must not come into contact with oils or greases. The brake pads must be replaced if they are fouled by such substances.

In the case of rotation-dependent brake pads, make sure the arrow marking points in the direction of rotation of the brake disc for when the vehicle is moving forward. Brake pads with left/right markings must be fitted on the relevant side of the vehicle.

One-sided angled areas on the brake pads must be located on the disc contact side of the brake caliper for when the vehicle is moving forward.

- Brake discs:

Brake discs must not be scored or cracked. Furthermore, minimum brake disc thickness, brake disc runout, parallelism and surface roughness of the friction surfaces must not exceed or drop below the permitted values.

Refer to Technical Data.

Always strip preservative off new parts before installation. With the rear brake discs, also strip preservative off brake drum on parking brake.

- Brake drums:

Brake drums must not be scored or cracked. Furthermore, the maximum drum inside diameter, radial runout and surface roughness of the friction surfaces must not exceed or drop below the permitted values.

Refer to Technical Data.

Always strip preservative off new parts before installation.



- Brake calipers:

Only approved glycol-based assembly pastes may be used for repairs on brake calipers.

All moving parts on the brake caliper must move freely: note grease specifications.

Use only BMW-approved lubricants to grease brake caliper guides (refer to BMW Service Operating Fluids).

- Brake lines and brake hoses must be correctly routed and must not abut with body or components in a way which would cause chafing.
- To prevent damage, release and tighten brake line couplings with a special brake line wrench only.
- The system must be bled each time any brake lines have been detached.
- All connection points must be checked for leaks.
- Only tighten down brake hoses on the front axle when wheels are in straight-ahead driving position.
- Close open connections on brake lines and individual components to prevent dirt from entering the brake system.
- Observe tightening torques when tightening down brake line screw connections.

Tightening torque, 34 32 1AZ.

The traction control system is basically maintenance-free.

However, be sure to adhere to the following:

- When carrying out welding work with electric welding equipment, be sure to disconnect the plug from the electronic control unit (ignition turned off).
- During painting work, the control unit may be subjected for brief periods to loads of max. 95 °C and for long periods (approx. 2 hours) to loads of max. 85 °C.
- Tighten down the battery terminals completely.
- The brake lines on the hydraulic unit must not be mixed up; if necessary, mark them before they are removed and after completing repairs perform the mix-up check with the DIS Tester.



**Important!**

After completing work:

- Carry out function check on brake test stand to ensure that the brakes comply with legal requirements.
- Carry out test braking while driving at low speed; the effectiveness of the brakes may be reduced during the initial braking operations.
- Exaggerated drastic and continuous braking operations for faster braking in are not permitted.
- Advise the customer not to perform any wilful drastic braking in the first 200 km after brake replacement.
- Attach mirror tag to interior rear-view mirror.

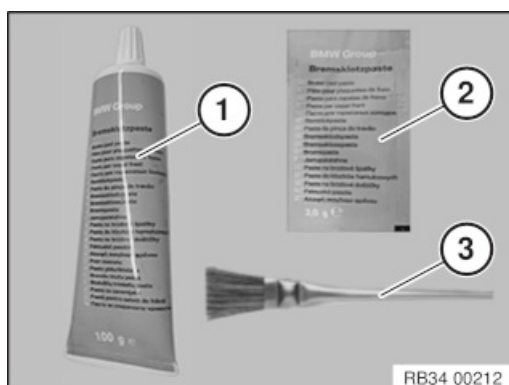




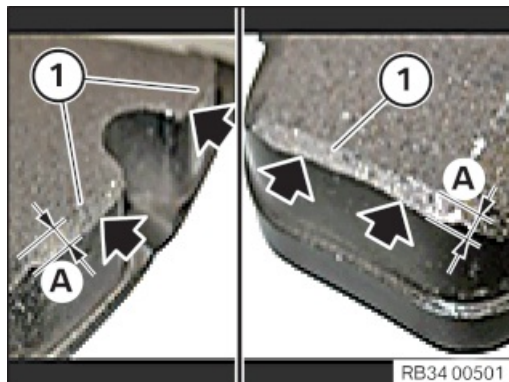
Attention!

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket, but rather clean with brake cleaner BMW TI. Clean number 83 19 2 154 780 and apply a thin coating of BMW TI brake pad paste. Coat number 83 19 2 158 851 (3 gr.) or 83 19 2 158 852 (100 gr.).

Spread brake pad paste onto the marked surfaces using a brush!



- (1) Brake pad paste 100 gr. BMW TI. Number 83 19 2 158 852
- (2) Brake pad paste 3 gr. BMW TI. Number 83 19 2 158 851
- (3) Brush for spreading brake pad paste over the marked areas.



Attention!

If new brake pads are mounted on a brake disc, the following must be observed:

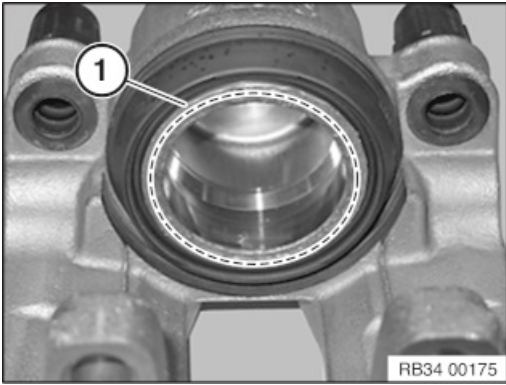
- Bevel edges in the area (1) slightly (dimension A must not exceed maximum 1 mm).

These procedures applies for all the following described brake systems.

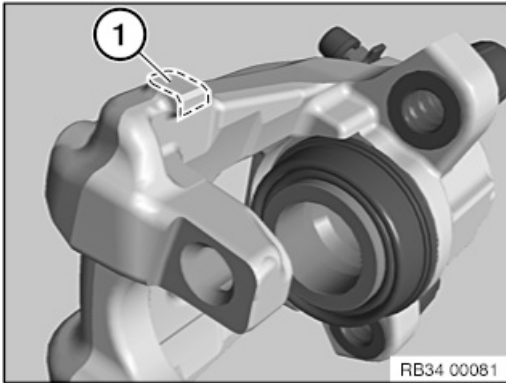


IPS brake (made by CBI), 1-piston floating caliper brake (model ranges: 1-Series, 3-Series, 4-Series, X3)

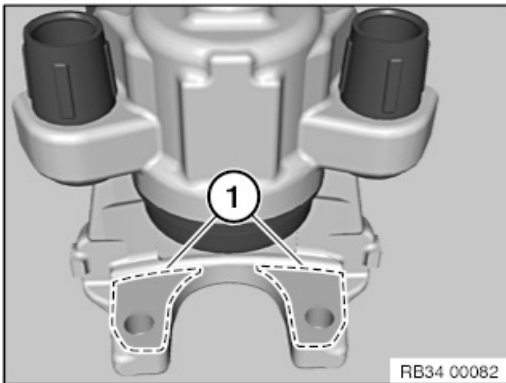




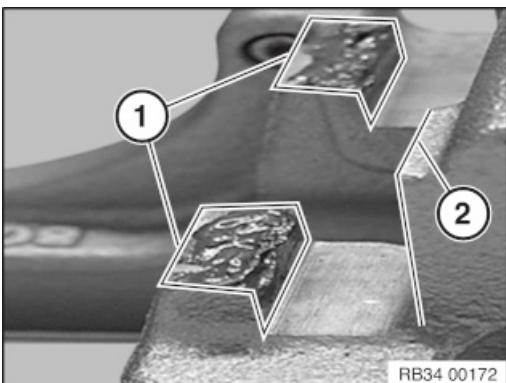
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.



Clean contact surfaces (1) of T-heads/brake calliper housing with brake cleaner and apply a thin coating of brake pad paste.

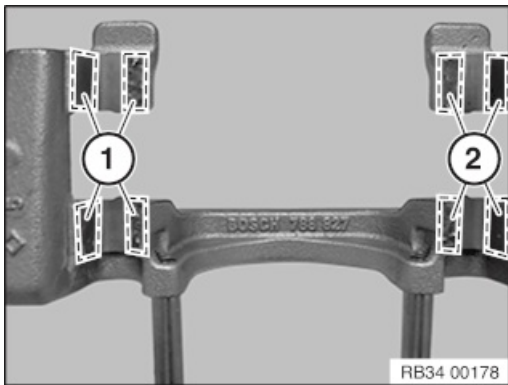


Clean contact surface (1) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.

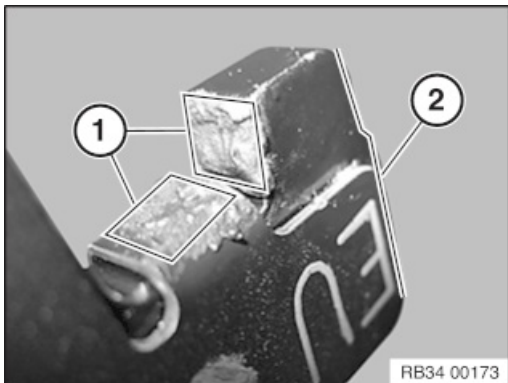


So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1) for the brake pads on the brake caliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.

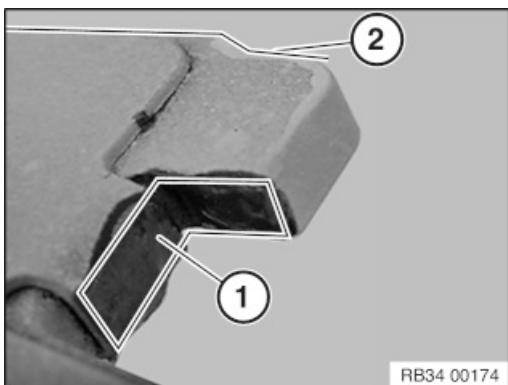




So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1 and 2) for the brake pads on the brake calliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.



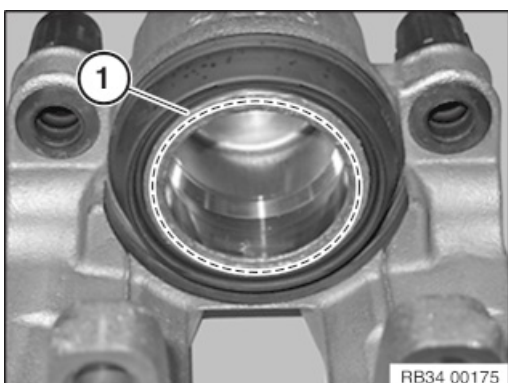
Apply a thin coating of brake pad paste to T-head of inner brake pad in area (1) and (2).



Apply a thin coating of brake pad paste to T-head of outer brake pad in area (1) and (2).

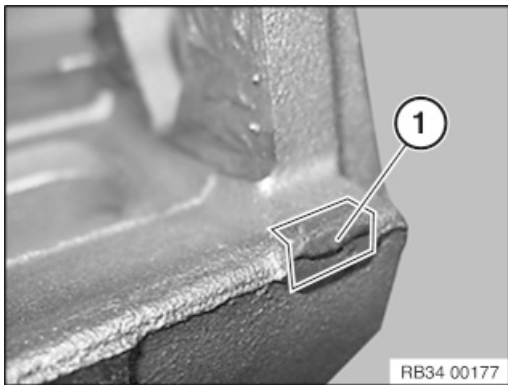


FN brake (made by Continental Teves), 1-piston floating caliper brake (model ranges: 5-Series, 6-Series, 7-Series, 8-Series, X1, X3, X5, Z4, Rolls-Royce)

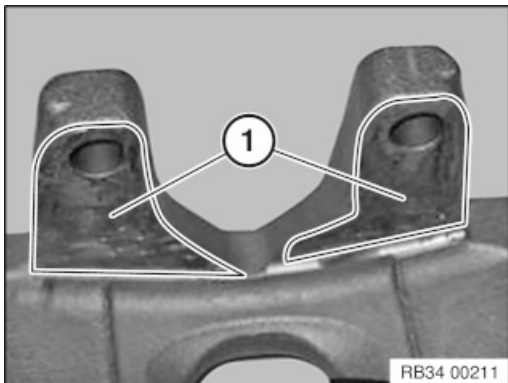


Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

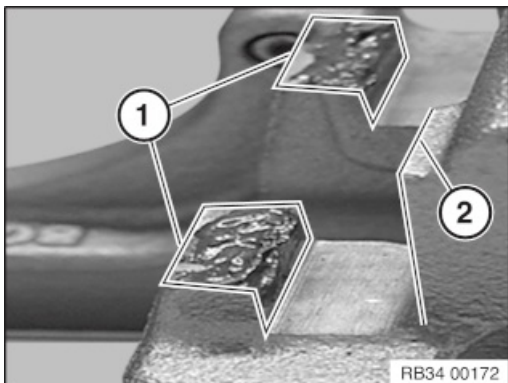




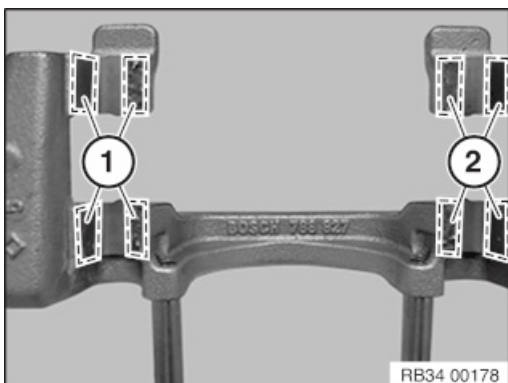
Clean contact surfaces (1) of T-heads/brake calliper housing with brake cleaner and apply a thin coating of brake pad paste.



Clean contact surface (1) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.

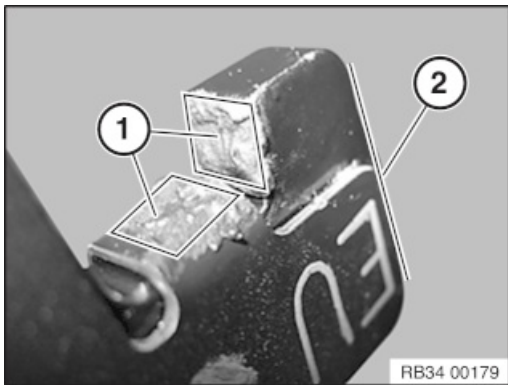


So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1) for the brake pads on the brake caliper mounting bracket. Clean guide surfaces (1) with brake cleaner and apply a thin coating of brake pad paste.

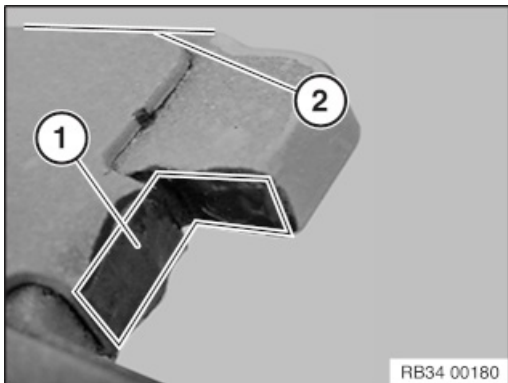


So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1 and 2) for the brake pads on the brake caliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.





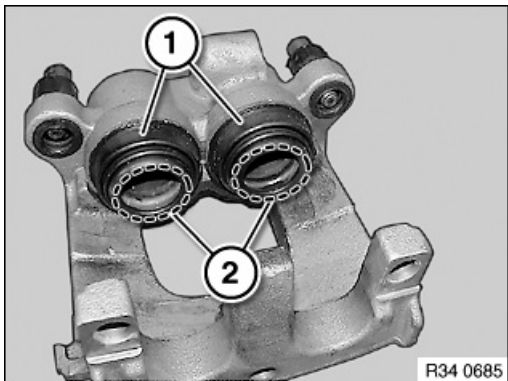
Lightly coat the T-head of the inner brake pad with brake pad paste in area (1 and 2).



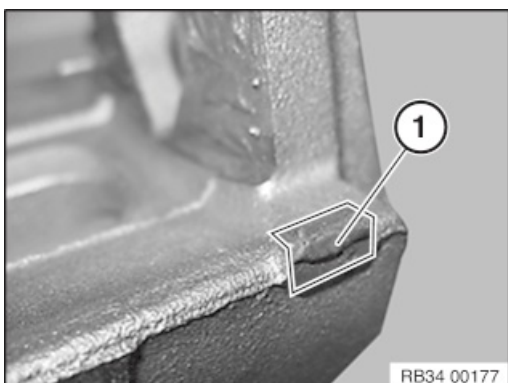
Lightly coat the T-head of the outer brake pad with brake pad paste in area (1 and 2).



FN brake (made by Continental Teves), 2-piston floating caliper brake (model ranges: 5-Series, 6-Series, 7-Series, 8-Series, X5, Rolls-Royce)

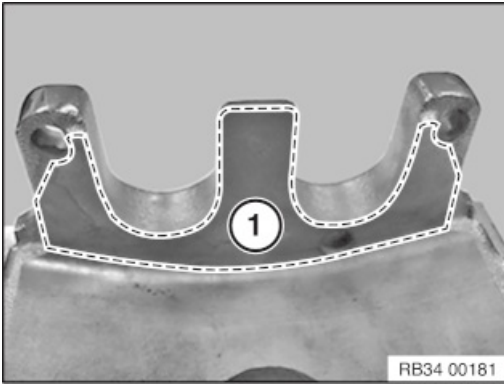


Clean contact surface (2) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

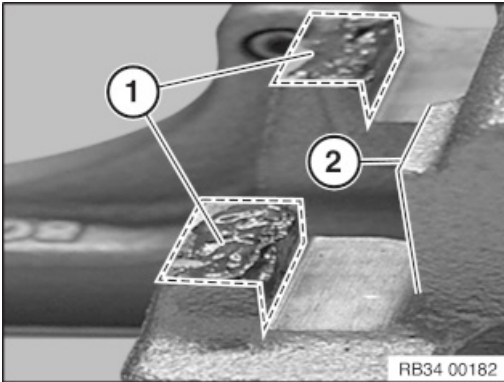


Clean contact surfaces (1) of T-heads/brake calliper housing with brake cleaner and apply a thin coating of brake pad paste.

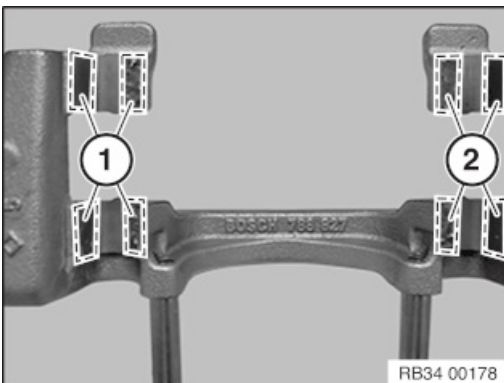




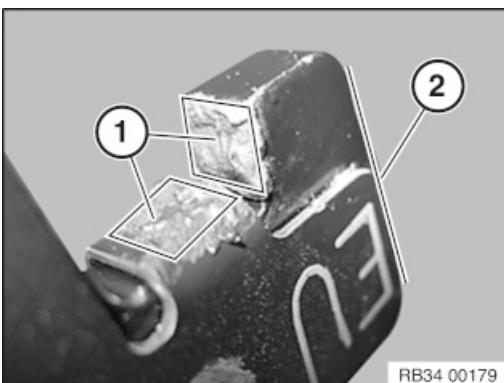
Clean contact surface (1) and brake caliper with brake cleaner and apply a thin coating of brake pad paste.



So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1 and 2) for the brake pads on the brake calliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.

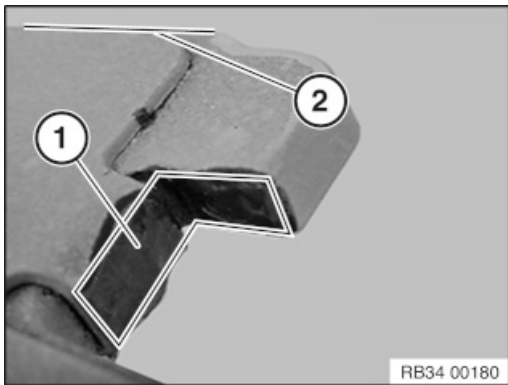


So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1 and 2) for the brake pads on the brake calliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.



Lightly coat the T-head of the inner brake pad with brake pad paste in area (1 and 2).

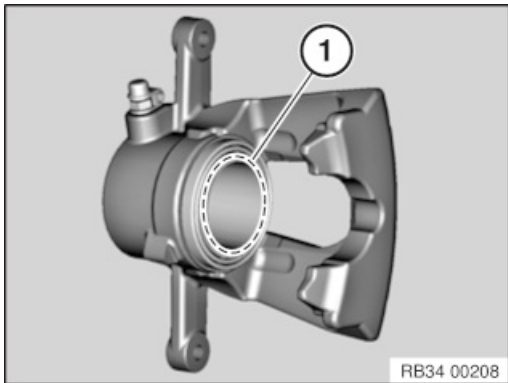




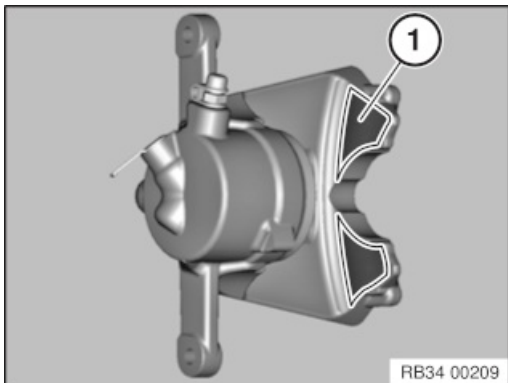
Lightly coat the T-head of the outer brake pad with brake pad paste in area (1 and 2).



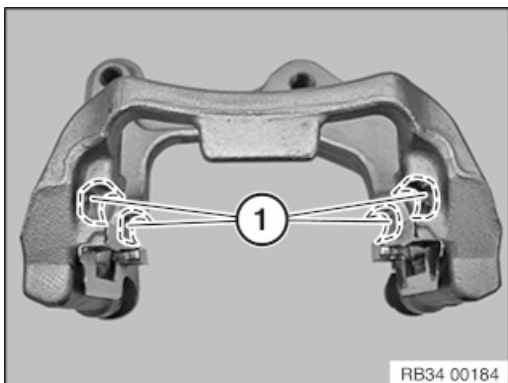
Collette brake (made by TRW), 1-piston brake caliper (model ranges: MINI, 1-Series, 5-Series, 6-Series, Z4)



Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

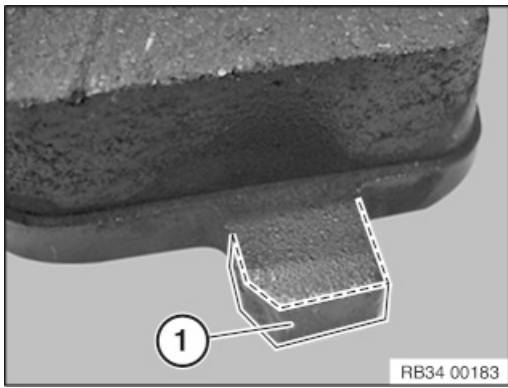


Clean contact surface (1) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.



So as not to damage the surface coating, if possible do not mechanically clean the guide surface (1) for the brake pads on the brake caliper mounting bracket. Clean guide surface (1) with brake cleaner and apply a thin coating of brake pad paste.

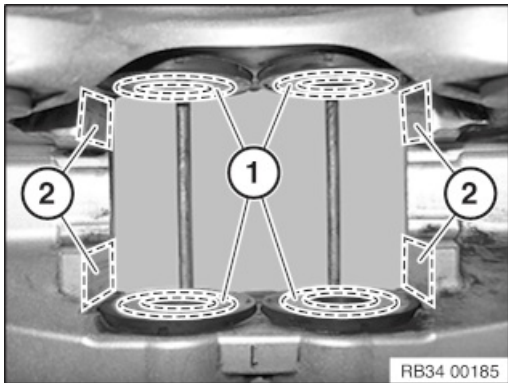




Apply a thin coating of brake pad paste to both sides of T-head of brake pad in area (1).



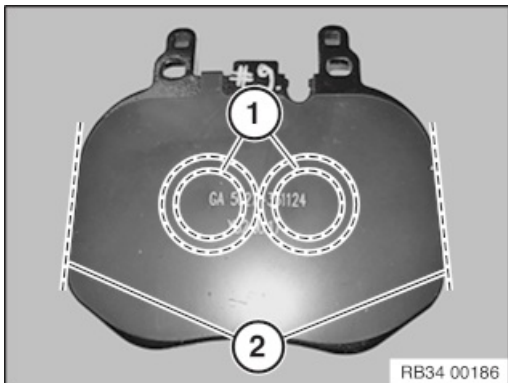
P 4.40 brake (made by Brembo), 4-piston fixed caliper brake (model ranges: MINI, 1-Series, 3-Series, 4-Series, 5-Series, 6-Series, 7-Series, 8-Series, X5, Rolls-Royce)



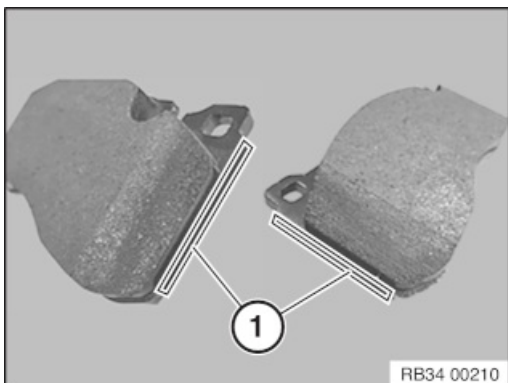
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (2) for the brake pads on the brake calliper mounting bracket. Clean guide surface (2) with brake cleaner and apply a thin coating of brake pad paste.

Clean both inner and outer guide surfaces (2) and apply a thin coating of brake pad paste.



Lightly coat both sides of the contact surface in area (1 and 2) with brake pad paste.

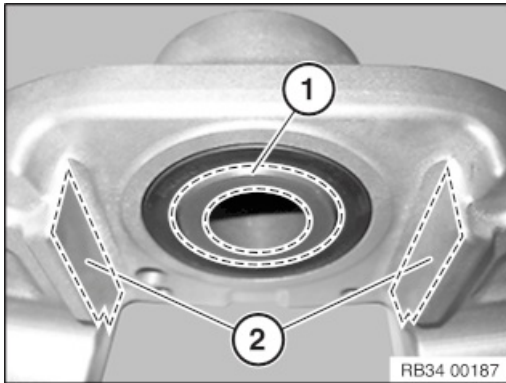


Lightly coat the brake pad contact surface on both sides in area (1) with brake pad paste.





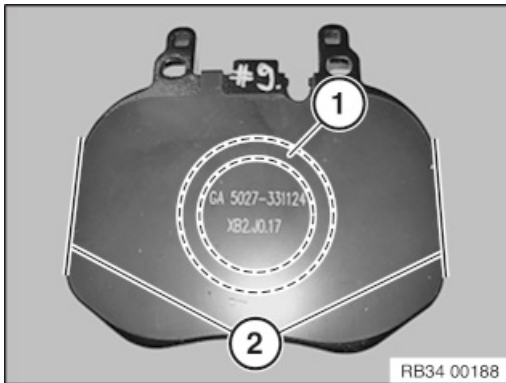
P 4.40 brake (made by Brembo), 2-piston fixed caliper brake (model ranges: 1 Series, 2 Series, 3 Series; does not apply to M2 F87)



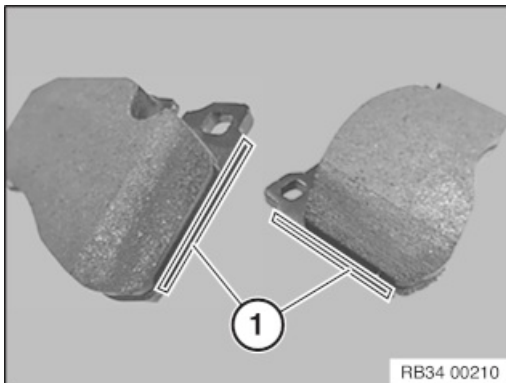
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (2) for the brake pads on the brake calliper mounting bracket. Clean guide surface (2) with brake cleaner and apply a thin coating of brake pad paste.

Clean both inner and outer guide surfaces (2) and apply a thin coating of brake pad paste.



Lightly coat both sides of the contact surface in area (1 and 2) with brake pad paste.

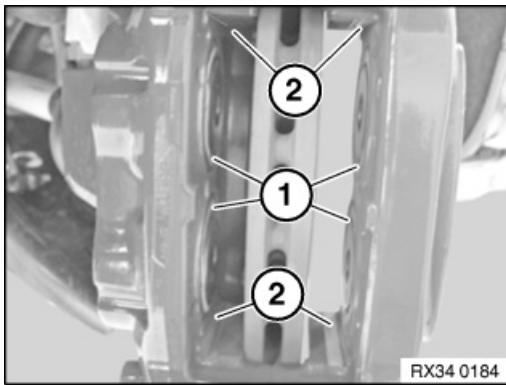


Lightly coat the brake pad contact surface on both sides in area (1) with brake pad paste.



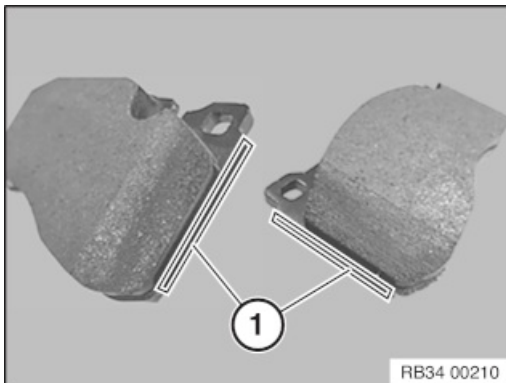
Brake (made by Brembo), 4-piston fixed caliper brake (model ranges: MINI F5x sport brake)





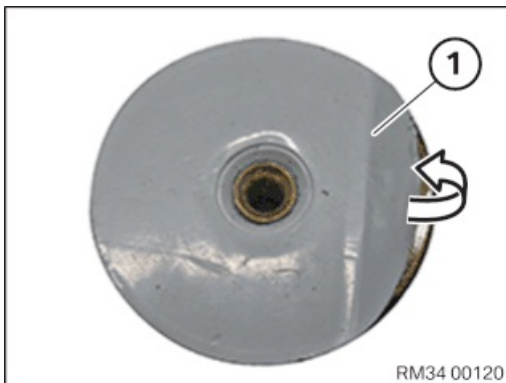
Check dust boot (1) for damage and replace if necessary.

Clean brake caliper compartments (2) and apply a thin coating of brake pad paste.



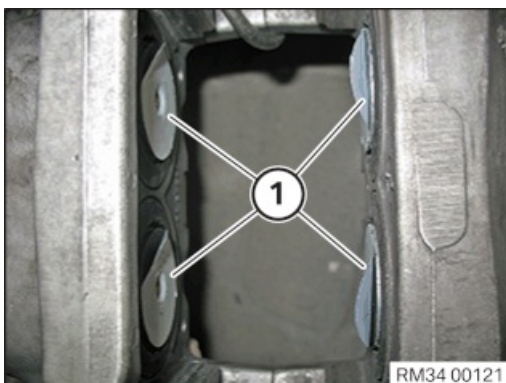
Lightly coat the brake pad contact surface on both sides in area (1) with brake pad paste.

Do not grease the brake lining backplate and thoroughly clean it with brake cleaner!



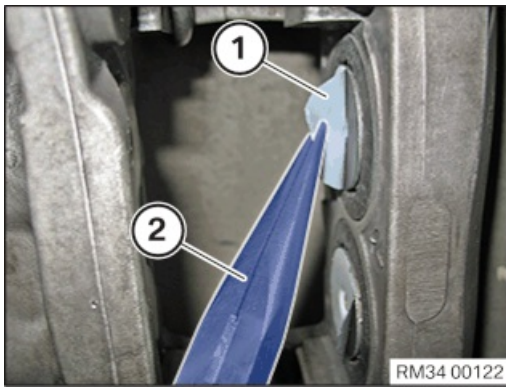
Only use new claw plates!

Slightly raise the protective film (1) at a place.

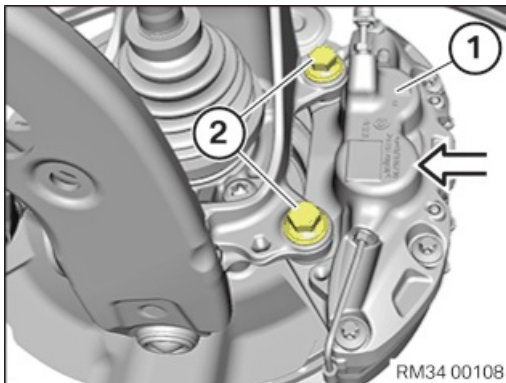


Insert the claw plates (1) into the brake pistons.





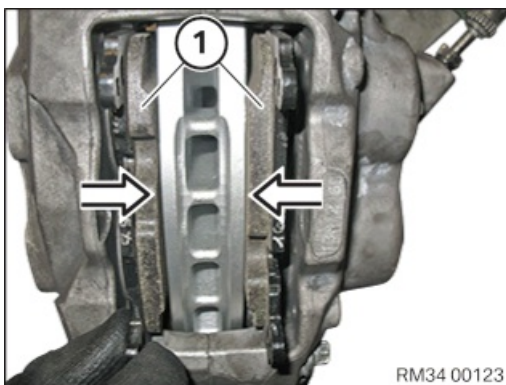
Pull off the protective film (1) with long-nose pliers (2). **Attention!**
The bonding surface of the claw plates must not be touched!



Install the brake caliper (1) in direction of arrow.

Parts: Replace screws (2).

Insert screws (2) and tighten.



Install the brake pad (1). **Attention!**

The brake pads must not touch the bonding surface of the claw plates when inserting!

Apply the brake pads to the brake disc and insert.



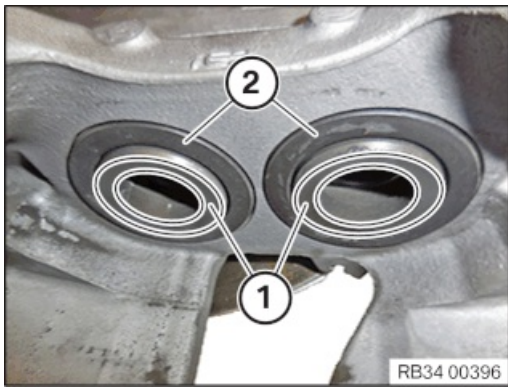
In order to ensure a complete bonding of the claw plates with the brake pads, the following instruction must be strictly adhered to:

Strongly press the brake pedal and hold it for at least 1 min!



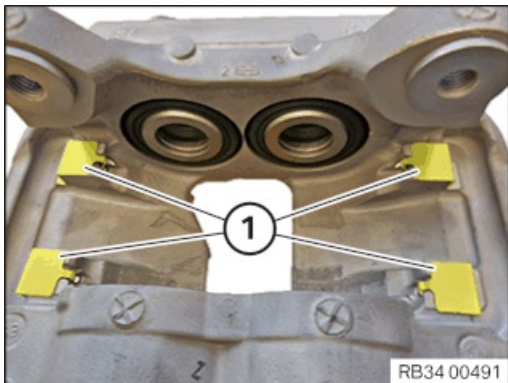
Brake (made by Continental), 4-piston fixed caliper brake (model ranges: 7-Series (G11, G12))





Clean the contact surface (1) of the brake piston (4 pieces) with brake cleaner.

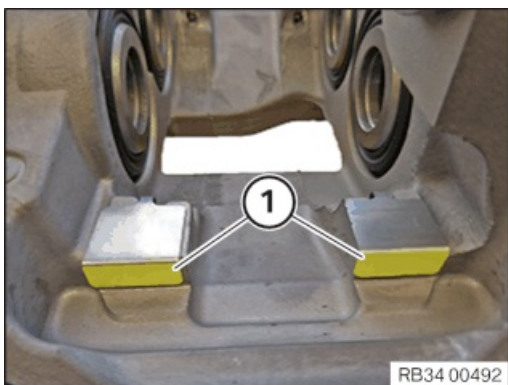
Check the dust boots (2) and renew as necessary.



Always renew retaining plates 1!

Mount retaining plate 1.

It is paramount that the slide panels are correctly positioned in the guides!

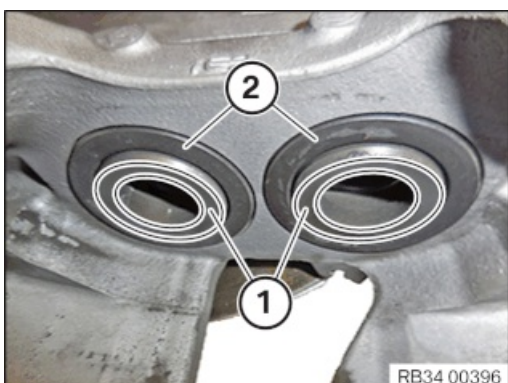


So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket.

Apply a thin layer of brake pad paste to the surfaces of the sliding plates (1).



Brake (made by Brembo), 4-piston fixed caliper brake (model ranges: 7-Series (G11, G12))

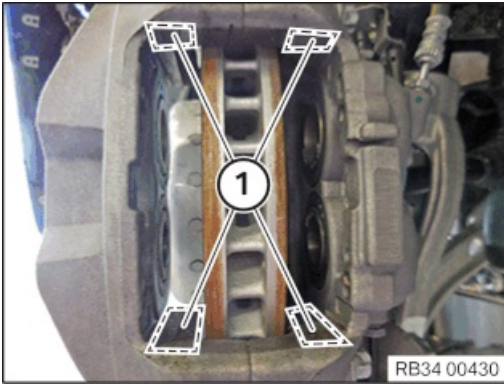


Clean the contact surface (1) of the brake piston (4 pieces) with brake cleaner.

Adhesive residues must be completely removed.

Check the dust boots (2) and renew as necessary.





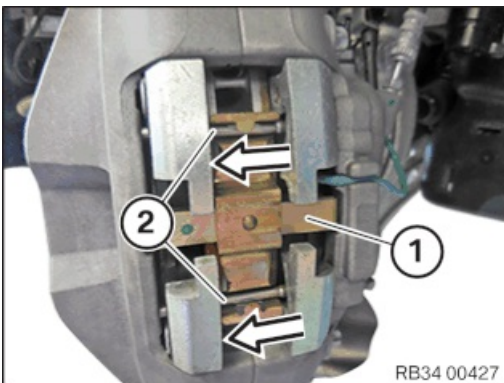
To prevent damage to the surface coating, do not clean the guide surfaces (1) for the brake pads on the brake calliper mechanically, if possible.

Clean guide surfaces (1) with brake cleaner and apply a thin coating of brake pad paste.



Remove the protective film of the adhesive layer (1) from the brake pads.

Do not touch the adhesive layer!



Insert brake pads in the brake caliper, making sure the adhesive layer does not touch the brake pistons.

Fit retaining clip (1).

Drive in the locking pins (2) in the direction of the arrow.

Attention!

After the brake pads have been installed they must immediately be bonded to the brake pistons:

- Step on the brake pedal to the floor and hold the pressure for one minute. This causes the brake pads to adhere to the brake pistons.



34 00 ... Manual determination for the extrapolation of the total braking force and minimum brake force shares for front and rear axle.

To the extent that the test stand computer does not provide an automatic calculation of the braking forces, the necessary evaluation values can also be determined manually.

Premises:

- Statutory minimum total braking force throughout the EU: $z \geq 58\%$
- additionally in Germany: Minimum share of VA and HA brake force according to manufacturer specifications

Input values:

1. Permitted total weight according to registration certificate part 1 column F1
2. maximum brake pedal force for minimum brake force 58% according to manufacturer specification
3. Input of the brake pedal force range for test application
4. x % minimum front axle brake force share of the total brake force according to type or series specific manufacturer specifications.
5. x % minimum rear axle brake force share of the total brake force according to type or series specific manufacturer specifications.

Manufacturer specific specifications for brake effect test as part of periodic vehicle inspections

Baureihe	Basismodell	Bemerkung	zulässiges Gesamtgewicht [kg]	max. Pedalkraft zur Erreichung einer Verzögerung von 58 % in [N]	minimaler Vorderachs-bremskraftanteil in [%]	minimaler Hinterachs-bremskraftanteil in [%]
E70/71/72	3.0i	XS	2680	240	53,3	19,4
E83	2.0i	X3	2200	200	52,3	19,8
E81	116i	3-türer	1780	170	51,8	21,2
E82	120d	Coupe	1820	170	51,3	21,6
E87	116i	5-türer	1745	170	51,8	21,2
E88	118i	Cabrio	1885	170	50,4	21,2
E90	316i	Limousine	1860	170	51,0	19,6
E91	316i	Touring	1960	170	48,8	19,6
E92	316i	Coupe	1800	170	51,9	19,6
E93	320i	Cabrio	2055	200	52,7	19,6
F01/04	730i	Limousine	2505	240	53,1	20,4
F02	730Li	Limousine lang	2515	240	53,1	20,4
F07	530dA	GT	2590	240	53,0	20,4
F10	523i	Limousine	2235	200	52,2	18,7
F11	523iT	Touring	2365	200	52,2	18,7
F12	635dA EU5	Cabrio	2080	200	55,9	18,6
F13	635dA EU5	Coupe	1920	170	55,9	18,6
R55	Mini One	Clubman	1680	170	60,8	13,8
R56	Mini One	2-türer	1550	170	60,8	14,9
R57	Mini One	Cabrio	1630	170	60,8	14,9
R60	Cooper D	Countryman	1575	170	54,8	19,3
F89	74 2.0i	Roadster	1750	170	51,7	21,3
E84	sDrive 1.8i	X1	2010	200	50,5	22,1
F25	sDrive 2.3i	X3	2275	200	51,3	21,6
RR01	xxx	Phantom	3200	240	51,6	21,4
RR04	xxx	Ghost	2940	240	50,9	21,9

Formulas

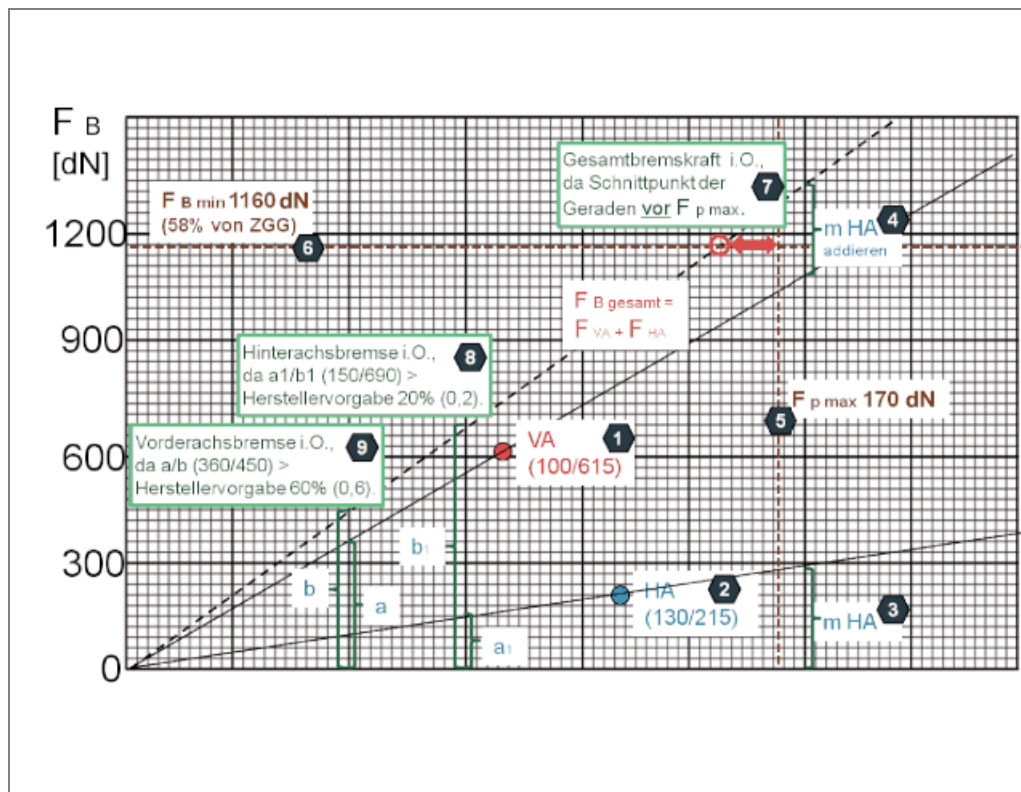
Total brake force	F total	= F VA + F HA
Rise VA	mVA	= F VA / Fp VA
Rise HA	mHA	= F HA / Fp HA
Total rise	m total	= m VA + m HA
Minimum share VA%	VA min	= VA / m total
Minimum share HA%	HA min	= HA / m total
Minimum brake force	F B min	$\hat{=} ZGG \times 0.58$
Brake force with F p max	F total nominal	= m total x Fp max



Definitions

FB VA	=Total of brake forces of the left and right front wheel
FB HA	=Total of brake forces of the left and right rear wheel
Fp VA	= Brake pedal force at the time of brake force measurement on VA
Fp HA	= Brake pedal force at the time of brake force measurement on HA
zGG	= Approved total weight of the vehicle
Fp max	= Maximum permitted brake pedal force according to manufacturer specifications

Practical implementation with millimetre paper and computer.



Practical implementation in an Excel table calculation.



A	B	C	D	E	F	G
1						
2	Fahrzeug-Basis-Daten					
3	Kennzeichen					
4	M-XY-1234					
5	Fahrgestell-Nummer					
6	WBAUX91030A944382					
7	Kilometerstand					
8	123456					
9						
10	Messwerte in gelbe Felder eintragen			Berechnungsmodell		
11	Bremskraft VA links [dN]	zugehörige Pedalkraft VA	Steigung VA	6,15		
12	305	100	Steigung HA	1,65		
13	Bremskraft VA rechts [dN]		Gesamtsteigung	7,80		
14	310					
15						
16	Bremskraft HA links [dN]	zugehörige Pedalkraft HA	Re/Li Abweichung VA	1,63%		
17	105	130	Re/Li Abweichung HA	4,65%		
18	Bremskraft HA rechts [dN]					
19	110					
20						
21	Herstellervorgaben in gelbe Felder eintragen					
22	Zulässiges Gesamtgewicht [kg]		Bremskraft bei max. Pedalkraft	1326,65		
23	2000		Mindestens nötige Bremskraft	1160,00		
24	Maximal zulässige Pedalkraft [N]					
25	170		Anteil HA an Gesamtbremskraft	21,19%		
26	Mindestens Bremskraftanteil HA		Anteil VA an Gesamtbremskraft	78,81%		
27	20%					
28	Mindestens Bremskraftanteil VA					
29	60%					

Practical implementation in an Excel table calculation including display of the stored calculation formulas.

A	B	C	D	E	F	G
1						
2	Fahrzeug-Basis-Daten					
3	Kennzeichen					
4	M-XY-1234					
5	Fahrgestell-Nummer					
6	WBAUX91030A944382					
7	Kilometerstand					
8	123456					
9						
10	Messwerte in gelbe Felder eintragen			Berechnungsmodell		
11	Bremskraft VA links [dN]	zugehörige Pedalkraft VA	Steigung VA	= (B12+B14)/C12		
12	305	100	Steigung HA	= (B17+B19)/C17		
13	Bremskraft VA rechts [dN]		Gesamtsteigung	= F11+F12		
14	310					
15						
16	Bremskraft HA links [dN]	zugehörige Pedalkraft HA	Re/Li Abweichung VA	= ABS((B12-B14)/((B12+B14)/2))	= WEI(F11*10+25% ; 0 ; "" ; n ; 0 ;)	
17	105	130	Re/Li Abweichung HA	= ABS((B17-B19)/((B17+B19)/2))	= WEI(F17*10+25% ; 0 ; "" ; n ; 0 ;)	
18	Bremskraft HA rechts [dN]					
19	110					
20						
21	Herstellervorgaben in gelbe Felder eintragen					
22	Zulässiges Gesamtgewicht [kg]		Bremskraft bei max. Pedalkraft	= F13*B25	= WEI(F11*F22+F23 ; 0 ; "" ; n ; 0 ;)	
23	2000		Mindestens nötige Bremskraft	= B23*0,58		
24	Maximal zulässige Pedalkraft [N]					
25	170		Anteil HA an Gesamtbremskraft	= F12/F13	= WEI(F12*F25+B27 ; 0 ; "" ; n ; 0 ;)	
26	Mindestens Bremskraftanteil HA		Anteil VA an Gesamtbremskraft	= F11/F13	= WEI(F11*F25+B29 ; 0 ; "" ; n ; 0 ;)	
27	0,2					
28	Mindestens Bremskraftanteil VA					
29	0,6					





Perform inspection in the following manner:

When 1st ratchet is engaged, no braking force should be exerted.

The difference in wheel circumferential forces between the left and right wheels may deviate by max. 30 % from the greater value (measured on brake test stand).

In event of larger deviations of wheel circumferential force: readjust handbrake.

It must be possible to lock up the rear wheels by braking with the handbrake.

The handbrake must be readjusted if the application travel is greater than 6 notches.



Note:

Proper adjustment of the handbrake is only possible if the handbrake cables and all moving parts of the handbrake mechanism move easily and function correctly.

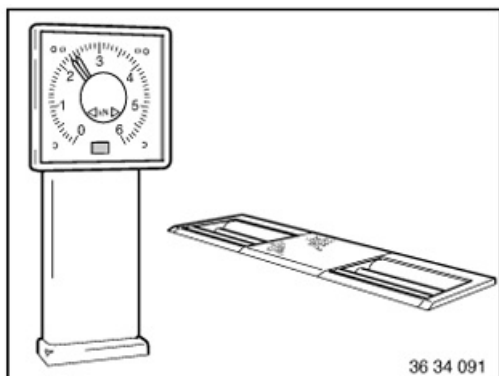
Basic adjustment of the handbrake is required in the event of:

- In event of excessive actuation stroke (6 teeth).
- When replacing parking brake Bowden cables
- Replacement of the handbrake lever



**Necessary preliminary tasks:**

- Check tyres for damage
- Check tyre treads
- Checking tyre pressure

**Important!**

The relevant system must be deactivated in vehicles with Automatic Stability Control plus Traction or DSC!

The Automatic Stability Control plus Traction or DSC indicator and warning light in the instrument cluster must light up!

The brakes must be at normal operating temperature. To do so, gently warm up the brake discs and brake drums while dry by braking the vehicle several times.

**Important!**

Only brake test stands with test speeds ≤ 5 km/h may be used.

You must observe the regulation contained in the operating instructions of the relevant test stand manufacturer.

Failure to do so may result in damage to the vehicle and the system and also personal injury.



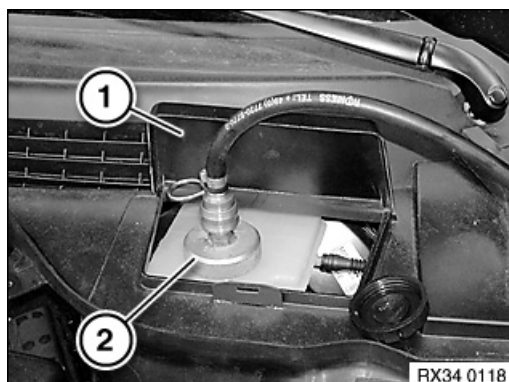
**Note:**

Read and comply with the instructions.

**Caution!**

When carrying out repairs to the brake system, follow the procedure set out in Bleeding brake system with DSC.

Always use MINI-approved brake fluids, refer to MINI Operating Fluids.



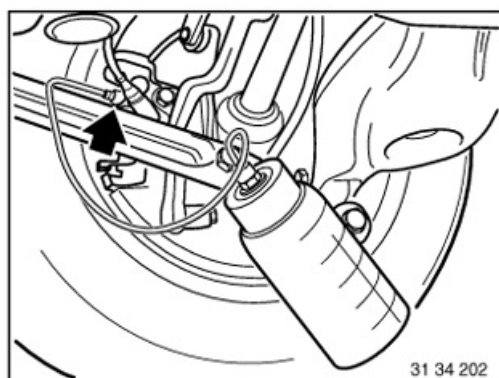
Open cover (1).

Connect bleeder unit to expansion tank (2) and switch on.

Caution!

Check relevant equipment manufacturer's operating instructions for each device.

Charging pressure should not exceed 2 bar.

**Completely bleed the brake system.**

Connect bleeder hose with collecting tray to bleeder valve on rear right brake caliper.

Open bleeder valve and purge until clear, bubble-free brake fluid emerges.

Close vent valve.

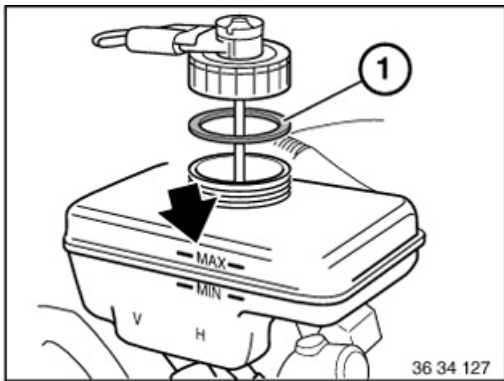
Tightening torque 34 00 1AZ.

Follow same procedure on rear left, front right and front left wheel brake.

**Note:**

The clutch slave cylinder must be scavenged in vehicles with manual gearbox.





Switch off bleeder unit and remove from expansion tank.

Check brake fluid level. If necessary, top up/draw off to max. level.

Close expansion tank.

Note:

Pay attention to rubber seal (1) in sealing cap.



00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



Warning!

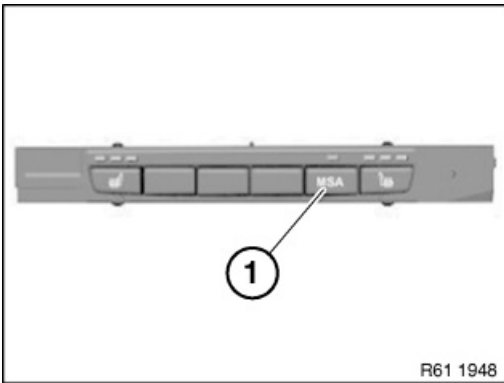
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

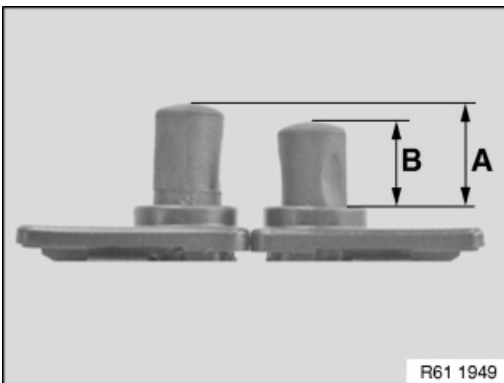
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode
 $A = 10 \text{ mm}$
 - Basic setting (engine hood/bonnet open)
 $B = 7 \text{ mm}$

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



When working with diagnosis tools:

- Observe instructions in diagnosis tool





Note:

For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) Service Information (bulletin) 61 01 07 335
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) Service Information (bulletin) 61 01 10 629



34 00 ... Table for the manufacturer type and/or series specific specified value for the service brake effect test for the official vehicle inspection

The following tables contain the values that are required for the calculation.

- Maximum brake pedal force for the statutory minimum braking force of 58 % in relation to the approved total vehicle weight.
- The percentages of minimum brake force shares for the front axle brake.
- The percentages of minimum brake force shares for the rear axle brake.

The specified value "Prüfbereich_Pedalkraft" for all vehicles: 50 – 150 N.

Vehicle specific value of the approved total weight for the evaluation of the statutory minimum brake force of 58 % on the vehicle to be tested. This value is included in the registration certificate, part 1 under column F1 and/or F2.

This only indicates the values for the basic models of the corresponding series, which means that the brake pedal forces that are listed for the minimum total brake force and percentage of minimum front and rear axle brake shares also apply to other types of this model and/or development series.

Baureihe	Basismodell	Bemerkung	zulässiges Gesamtgewicht [kg]	max. Pedalkraft zur Erreichung einer Verzögerung von 58 % in [N]	minimaler Vorderachs-bremskraftanteil in [%]	minimaler Hinterachs-bremskraftanteil in [%]
E31	840Gi	Coupe	2240	200	57,9	17,4
E32	730i	Limousine	2185	200	58,2	17,2
E34	518i	Limousine	1840	170	58,2	17,2
E34	518i	Touring	2015	200	55,7	18,7
E36/2	316i	Coupe	1735	170	57,0	17,9
E36/3	316i	Touring	1820	170	54,4	19,6
E36/4	316i	Limousine	1735	170	57,0	17,9
E36/5	316i	Compact	1680	170	60,4	16,0
E36/C	318i	Cabrio	1810	170	54,4	19,6
Z3	1.8i	Roadster	1490	170	57,6	17,6
E38	728i	Limousine	2300	200	57,2	17,2
E39	520i	Limousine	2010	200	57,2	17,0
E39/2	520i	Touring	2225	200	56,3	18,4
E39	M5	Limousine	2490	200	54,7	19,3
E46/2	316Gi	Coupe	1820	170	51,8	21,0
E46/3	316Ti	Touring	1920	170	52,2	19,4
E46/4	316i	Limousine	1820	170	51,8	19,4
E46/5	316i	Compact	1820	170	51,8	21,0
E46	M3	Coupe	2000	200	50,8	20,1
E53	3.0i	X5	2620	240	55,8	17,6
E60	520i	Limousine	2000	200	51,6	19,5
E61	520Ti	Touring	2160	200	51,6	19,5
E63	630Gi	Coupe	1960	170	52,9	19,5
E64	630i	Cabrio	2120	200	54,5	19,5
E65	730i	Limousine	2505	240	51,6	20,5



Baureihe	Basismodell	Bemerkung	zulässiges Gesamtgewicht [kg]	max. Pedalkraft zur Erreichung einer Verzögerung von 58 % in [N]	minimaler Vorderachs- bremskraftanteil in [%]	minimaler Hinterachs- bremskraftanteil in [%]
E70/71/72	3.0i	X5	2680	240	53,3	19,4
E83	2.0i	X3	2200	200	52,3	19,8
E81	116i	3-türer	1780	170	51,8	21,2
E82	120d	Coupe	1820	170	51,3	21,6
E87	116i	5-türer	1745	170	51,8	21,2
E88	118i	Cabrio	1885	170	50,4	21,2
E90	316i	Limousine	1860	170	51,0	19,6
E91	316i	Touring	1960	170	48,8	19,6
E92	316i	Coupe	1800	170	51,9	19,6
E93	320i	Cabrio	2055	200	52,7	19,6
F01/04	730i	Limousine	2505	240	53,1	20,4
F02	730Li	Limousine lang	2515	240	53,1	20,4
F07	530dA	GT	2590	240	53,0	20,4
F10	523i	Limousine	2235	200	52,2	18,7
F11	523iT	Touring	2365	200	52,2	18,7
F12	635dA EU5	Cabrio	2080	200	55,9	18,6
F13	635dA EU5	Coupe	1920	170	55,9	18,6
R55	Mini One	Clubman	1680	170	60,8	13,8
R56	Mini One	2-türer	1550	170	60,8	14,9
R57	Mini One	Cabrio	1630	170	60,8	14,9
R60	Cooper D	Countryman	1575	170	54,8	19,3
F89	Z4 2.0i	Roadster	1750	170	51,7	21,3
E84	sDrive 1.8i	X1	2010	200	50,5	22,1
F25	sDrive 2.3i	X3	2275	200	51,3	21,6
RR01	xxx	Phantom	3200	240	51,6	21,4
RR04	xxx	Ghost	2940	240	50,9	21,9



34 00 ... Testing of service brakes at the official periodic vehicle check according to EU Directive 2010/48/EU and Germany § 29_StVZO for vehicles with first registration beginning on July 28, 2010.

Series: 1: E81-E88; F20-F21 / 3: E90-E93; F30-F31 / 5: F07-F11; F18 / 6: F06, F12-F13 / 7: F01-F04; X1: E84 / X3: F25 / X5: E70 / X6: E71-E72 / Z4: E89 / MINI: R55-R61 / Rolls Royce

Situation:

For official periodic vehicle inspections according to EU Directive 2010/48/EU and § 29 of the German road traffic licensing regulations (StVZO) as per the revised directive, new inspection specifications apply beginning on 01.07.2012 for the functional test of the service brakes on EU Class M1 vehicles (passenger car up to 3.5 t permitted total weight) and first registered from 28.07.2010 onwards.

Prior the mechanical brake force measurement the electronic function check for the corresponding brake system must always be performed by way of evaluation of the system specific function control gauges in the instrument cluster and/or messages on the Check Control display (ABS, DSC, and brake pad wear and brake fluid display)!

Functional check of the service brake:

Prior to the brake test, the service brake must be conditioned by braking 2 or 3 times from increased walking speed to vehicle standstill.

For vehicles with combustion engines, the engine must run to maintain the vacuum for the power assistance of the service brake. For the same reason, the driving readiness ("ignition") must be switched on with electrical vehicles to ensure the electrical vacuum generation.

EU and Germany:

Vehicle braking (z) with the service brake **at least 58 % of the authorized vehicle total weight**, instead of the previous 50 %.

Reference value for this minimum braking action **is**, according to ECE Directive 13H, is a **brake pedal operating force of max. 500 N**.

Note: For M1 vehicles with a first registration date prior to July 28, 2010, a minimum brake force of 50% continues to be valid!

Braking according to the guidelines listed above is defined as:

$$z = \frac{\text{Total of brake forces of all wheels at the wheel output}}{\text{Weight force of the vehicle (zGG)}} \times 100 (\%)$$

Example: BMW X3 F25: approved total weight (zGG.): 2300 kg.

Measured brake force values on brake test stand:

Service brake	Front	Rear
Left	435 daN	335 daN
Right	434 daN	336 daN

Evaluation of service brake:

$$z = \frac{1540}{2300} \times 100 (\%) = 66.96 \% \text{ is OK because greater than 58\%}$$

Note:

Since the vehicles to be tested usually do not indicate the approved total weight at the time of the test, and





specific manufacturer values according the table in Appendix 1.

Total front axle brake forces

1. Front axle share= x 100 (%)

Total brake force of all axles

Manufacturer specification:

The following calculation results from the previous example for the BMW X3:

435 daN + 434 daN

Front axle brake force share= x 100 (%) =56% is OK because greater than 51.3%

-

435+434+335

+336daN

Total rear axle brake forces

2. Rear axle brake share= x 100 (%)

Total brake force of all axles

Manufacturer specification:

The following calculation results from the previous example for the BMW X3:

335 daN + 336 daN

Rear axle brake force share= x 100 (%) =44% is OK because greater than 21%

435+434+335 +336 daN

General note:

This means that the official test of the service brake **absolutely requires the use of a brake pedal force measuring sensor.**

The manufacturers of brake test stands have been offering these items for many years as test stand accessory.

Examples are:



Position 1: MAHA, Haldenwang

Position 2: AHS, Bremen



02	02	0135/04000	210
- 04648		- 1881	
- 1661		01800 - 01800	
	00100		
147	002300	002300	
01080	01280		
01080	01280		
078	03000	074	
02400	0750	005	

The approved total weight of the vehicle must be derived from the registration Part 1 from column F1 or F2.

Since the law primarily requires that brake effect tests are performed on brake test stands, BMW Group vehicles **must be tested on roller test stands!**

Next, the statutory tolerance of the axle "right-left deviation, limit value max. 25%, must be determined in the upper range of the measured brake forces.

In addition, the minimum brake force shares must be determined separately for the front and rear axle in compliance with the additional German specifications and referenced to the manufacturer specifications.

General notes:

It is recommended to check the brakes as part of the manufacturer required vehicle inspection and **before** the official vehicle inspection according to the specified values indicated here.

To make work easier for the **referencing: Brake pedal force to brake force** we urgently recommend to have your test stand manufacturer set up an electronic measured value transmission from the brake pedal force measuring tool to the test stand computer.

The installation of a calculation program to determine the minimum total braking on the test stand computer to achieve the correct evaluation - especially when it is necessary to extrapolate the actual brake force in relation to the setpoint value at the corresponding brake pedal force - is also deemed absolutely necessary.

The integration of a database for the type specific vehicle specifications (brake pedal forces, front and rear axle brake shares) simplifies the overall brake test.

These specification will also be indicated in the technical data and/or repair instructions in the future as minimum values, which will only be updated and/or maintained model-specific there.

The test procedure for the mechanical or electrical operated parking brakes, and/or the regenerative valve for hybrid or electric vehicles are listed in the corresponding repair instructions.

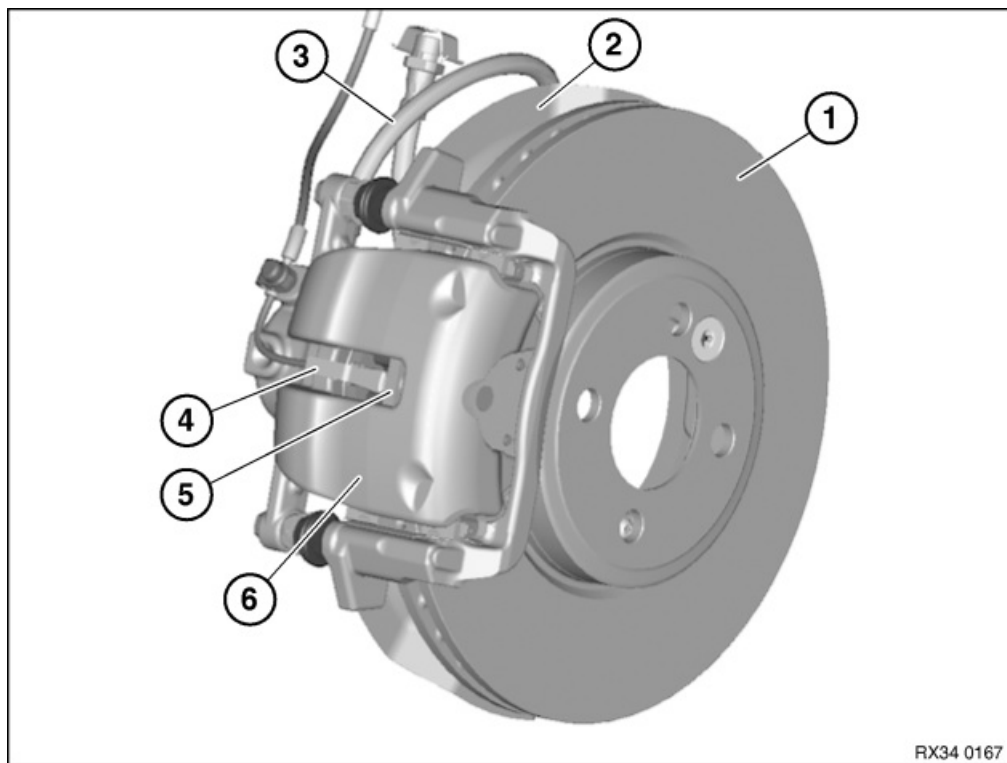
In the event of specifications for the brake test that deviate from country authorities of EU states and/or newer issues of the German road traffic licensing regulations, or the application of manufacturer and/or type specific target data is prohibited, compliance with same is required.

In this case, we request that you will send the corresponding information to the publisher of this service information.

- Enclosure 1: Type specific specifications to test the service brake
- Enclosure 2: Manual calculation of braking when this is not supported by the test stand.



34 11 ... Overview of front brakes



- 1 Brake disc 2 Brake guard plate
- 3 Brake hose 4 Brake-pad-wear sensor
- 5 Brake pad 6 Brake caliper



**Attention!**

Always precision-turn both sides of both brake discs on one axle.

Maximum machining dimension per friction ring side is 0.8 mm!

Minimum brake disc thickness (MIN TH)

Brake discs of M models (Compound brake discs) must **not** be machined!

Only one brake pad set may be used up on brake discs which have been lathe-turned to minimum thickness (MIN TH).

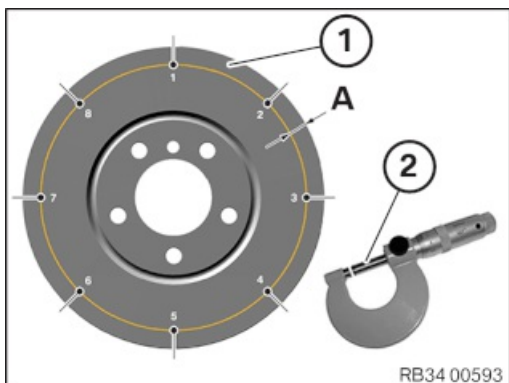
**Mobile brake disc lathe:****Attention!**

Only BMW-approved brake disc lathes may be used!

In the case of mobile brake disc lathes, the brake caliper and the caliper carrier must be removed.

The brake discs remain on the vehicle.

Please refer to the equipment manufacturer's operating instructions for the exact procedure.



After the precision turn of the brake disc, the difference in thickness must be measured at 8 different points (1) approx. 10 mm (dimension A) from the outer edge of the disc using a caliper gauge (2)!

Permissible thickness difference: see Technical Data!



**Special tools required:**

- 34 1 280

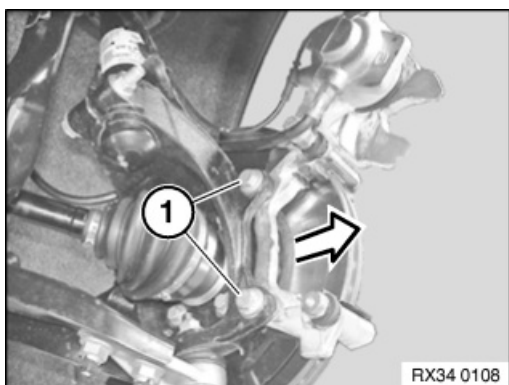
**Important!**

Brake discs must only be replaced in pairs (per axle).
Fit new brake discs only together with new brake pads.

**Necessary preliminary tasks:**

- Remove front brake pads.

After completing work, read and comply with notes on braking in new brake discs / brake pads.

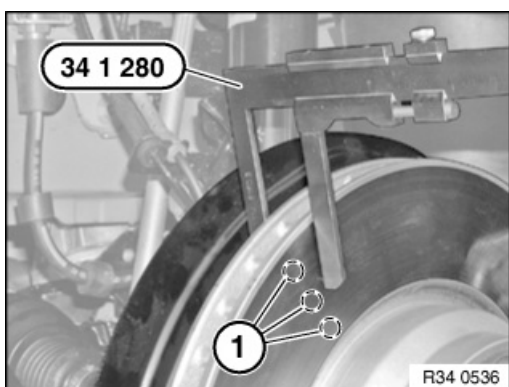


Release screws (1).

Remove brake caliper with brake anchor plate in direction of arrow and tie up.

Installation note:

Tightening torque 34 11 2AZ.



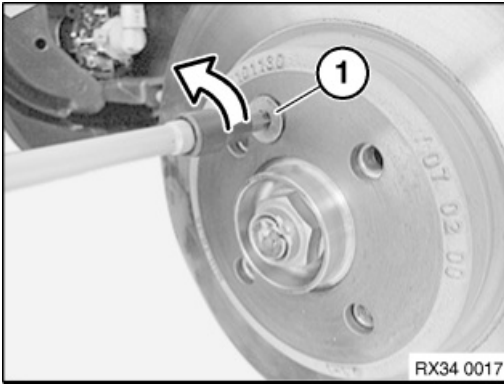
Check minimum brake disc thickness:

- Position special tool 34 1 280 at three measuring points in area (1) and measure.
- Compare measuring result and lowest value with setpoint value.

**Important!**

New brake pads may only be fitted if the brake disc thickness is greater than the minimum brake disc thickness (MIN TH).





Release screw (1) and remove brake disc. *Installation note:*

Replace screw (1).

Tightening torque 34 11 1AZ.

Clean contact surface of wheel hub thoroughly and remove any traces of rust if necessary.

Irregularities in the contact surface can cause distortion in the brake disc!



Important!

When removing the brake disc: On no account strike the friction ring with a hammer or similar object! If necessary, carefully tap with a rubber mallet against the brake disc chamber.





Special tools required:

- 34 1 280



Important!

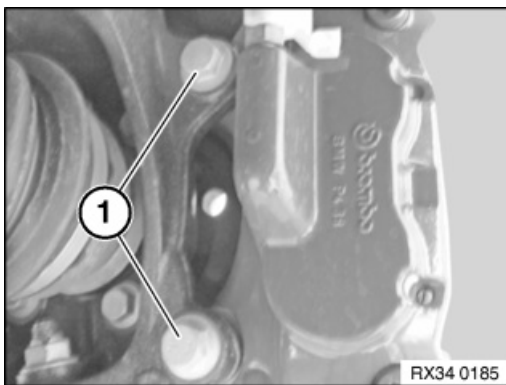
Brake discs must only be replaced in pairs (per axle).
Fit new brake discs only together with new brake pads.



Necessary preliminary tasks:

- Remove front brake pads

After completing work, read and comply with notes on braking in new brake discs / brake pads .

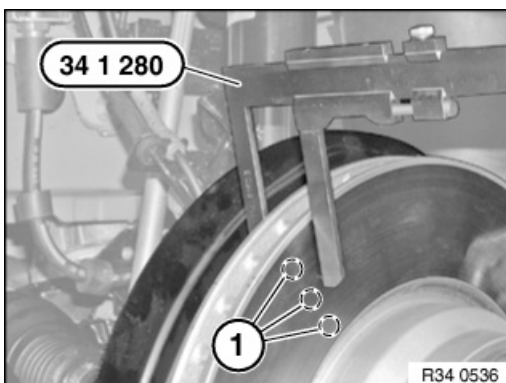


Release screws (1).

Remove brake caliper and tie back.

Installation:

Tightening torque 34 11 2AZ .



Check minimum brake disc thickness:

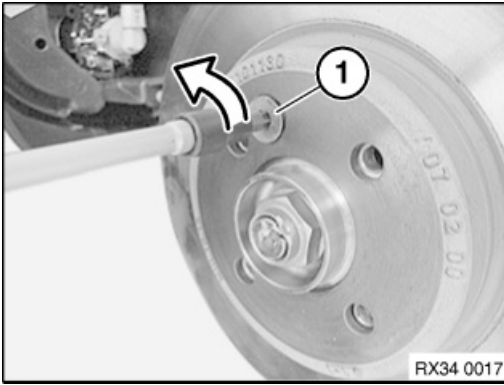
- Position special tool 34 1 280 at three measuring points in area (1) and measure .
- Compare measurement result and lowest value with setpoint value .



Important!

New brake pads may only be fitted if the brake disc thickness is greater than the minimum brake disc thickness (MIN TH).



**Important!**

When removing the brake disc: On no account strike the friction ring with a hammer or similar object! If necessary, carefully tap with a rubber hammer against the brake disc nave.

Release screw (1) and remove brake disc. *Installation:*

Replace screw (1).

Tightening torque 34 11 1AZ .

Clean contact face of wheel hub thoroughly and remove any traces of rust if necessary.

Irregularities in the contact surface can cause distortion in the brake disc!





Special tools required:

- 34 1 050
- 34 1 280
- 2 352 960



Caution!

- **Brake pad wear sensor:** After removal it must be replaced (brake pad wear sensor loses its retention capability in the break pad).
- **Retaining pin and expanding spring:** for vehicles older than 48 months it is recommended to replace the retaining spring!

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket, but rather clean with brake cleaner BMW TI. number 83 19 2 154 780 and apply a thin coating of break pad paste BMW TI. number 83 19 2 158 851 (3 gr.) or 83 19 2 158 852 (100 gr.).

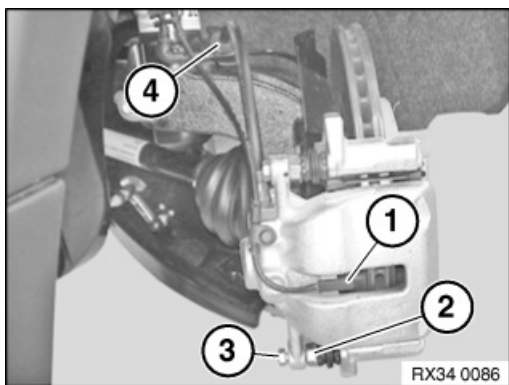
Spread brake pad paste onto the marked surfaces using a brush!

Observe regulation on applying brake pad paste to brake pads and brake anchor plates!



Necessary preliminary work:

- Remove front wheels.
- Remove brake pad wear sensor.



Pull the brake pad wear sensor (1) toward the front out of the brake bad (left side only).

Release guide screw (3).

If necessary, grip at hexagon head (2).

Feed brake hose out of holder (4).

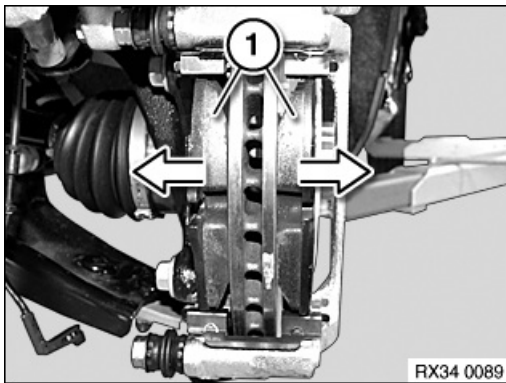
Tilt brake caliper upwards.

Installation note:

Replace guide screw.

Tightening torque 34 11 3AZ.





Remove brake pads (1) in direction of arrow from caliper carrier.

Caution!

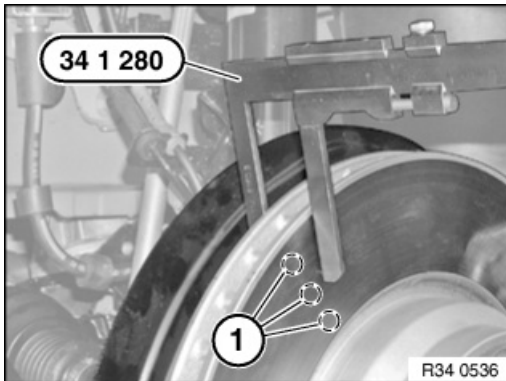
Mark any worn brake pads.

In the event of one-sided brake pad wear, do not change brake pads round.

Observe minimum thickness of brake pads.

Clean brake pads.

Do not apply grease to brake lining backplate.



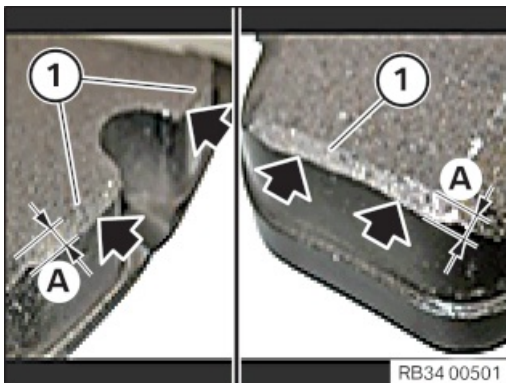
Check minimum brake disc thickness:

- Position special tool 34 1 280 at three measuring points in area (1) and measure.
- Compare measuring result and lowest value with setpoint value.



Caution!

New brake pads may only be fitted if the brake disk thickness is greater than the minimum brake disc thickness.



Caution!

If new brake pads are mounted on a brake disc, the following must be observed:

- Bevel edges in the area (1) slightly (dimension A must not exceed maximum 1 mm).

These procedures applies for all the following described brake systems.

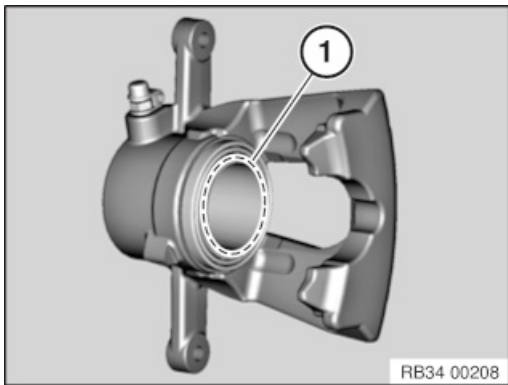


Press back brake pads and piston with special tool 2 352 960 .**Caution!**

When forcing piston back:

- Pay attention to brake fluid level in expansion tank; brake fluid that spills over will damage paintwork.



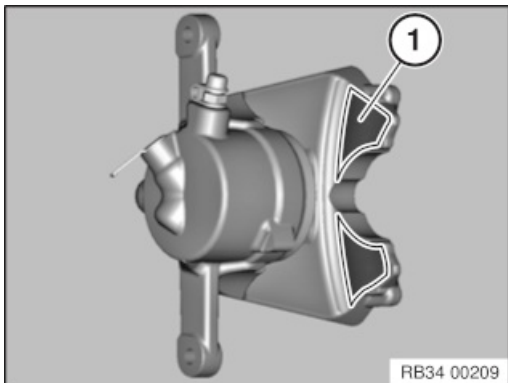


Check dust boot for damage and renew if necessary.

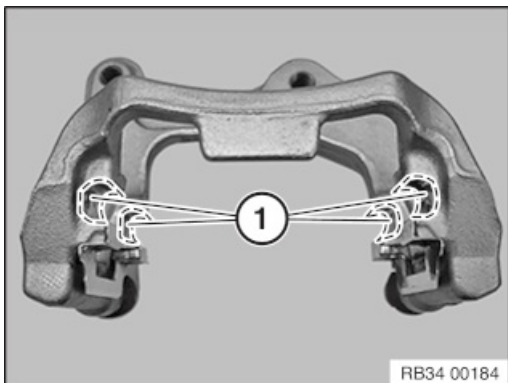
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

Caution!

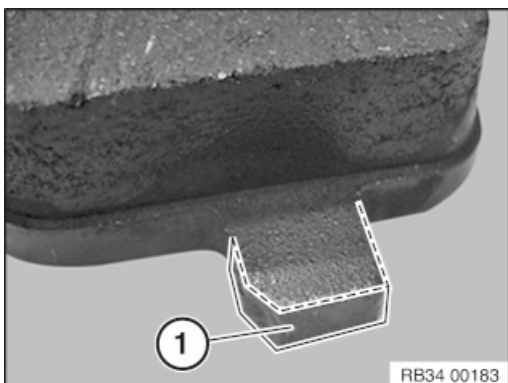
Dust boot must not come into contact with brake pad paste as this may cause the dust boot to swell.



Clean contact surface (1) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.

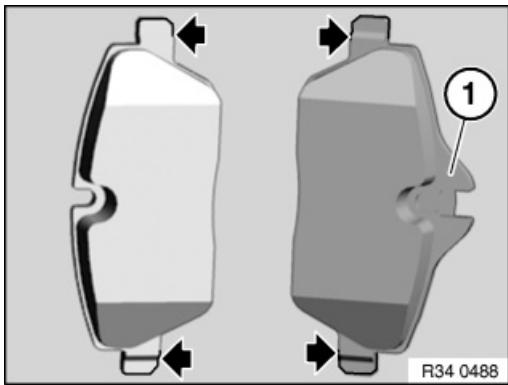


So as not to damage the surface coating, if possible do not mechanically clean the guide surface (1) for the brake pads on the brake caliper mounting bracket. Clean guide surface (1) with brake cleaner and apply a thin coating of brake pad paste.



Apply a thin coating of brake pad paste to both sides of T-head of brake pad in area (1).





Caution!

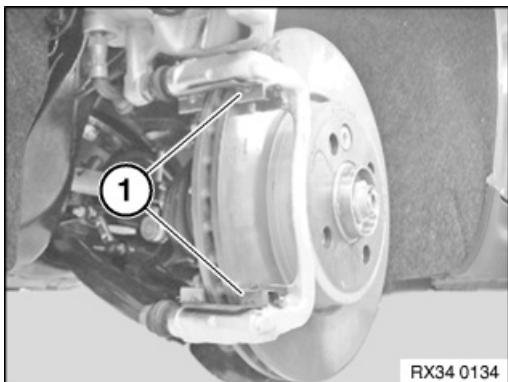
Brake pad with bulge (1) is intended for accommodating the brake pad wear sensor and must be fitted on the piston side.



Note:

After completing repair work:

- Fully depress brake pedal several times so that brake pads contact brake discs.
- When installing new brake pads at front and rear axles, brake fluid level must be brought up to "MAX" mark.
- Read and comply with notes on braking in new brake discs / brake pads.
- If necessary, when replacing brake pads, reset CBS display as per factory specification.



Replacement:

Remove lining spring (1) and replace.

Installation note:

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1) for the brake pads on the brake caliper mounting bracket. Instead, clean with brake cleaner and apply a thin coating of brake pad paste.



34 11 000 Removing and installing/replacing brake pads on both front disc brakes (Brembo)



Special tools required:

- 34 1 050
- 34 1 280



Attention!

- **Brake pad wear sensor:** After removal it must be replaced (brake pad wear sensor loses its retention capability in the break pad).
- **Retaining pins and expanding spring:** for vehicles older than 48 months it is recommended to replace the retaining spring!

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket, but rather clean with brake cleaner BMW TI. number 83 19 2 154 780 and apply a thin coating of break pad paste BMW TI. number 83 19 2 158 851 (3 gr.) or 83 19 2 158 852 (100 gr.).

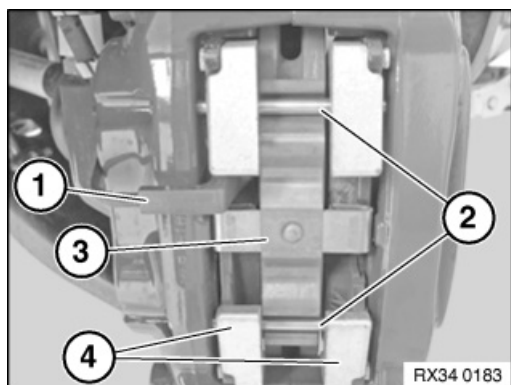
Spread brake pad paste onto the marked surfaces using a brush!

Observe guideline for applying brake pad paste on brake pads and brake anchor plate!



Necessary preliminary tasks:

- Remove front wheels.
- Remove brake pad wear sensor.



Pull brake pad wear sensor (1) forward out of the brake pad (left side only when replacing brake pads).

Drive out retaining pins (2).

Remove expanding spring (3).

Remove brake pads (4).

Attention!

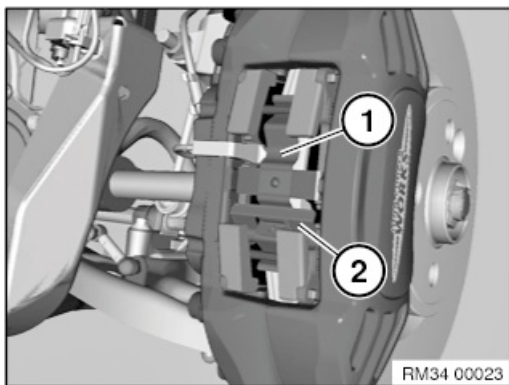
Mark any worn brake pads.

In the event of one-sided brake pad wear, do not change brake pads round.

Do not grease backs of brake pads sleeve.

Clean brake pads.





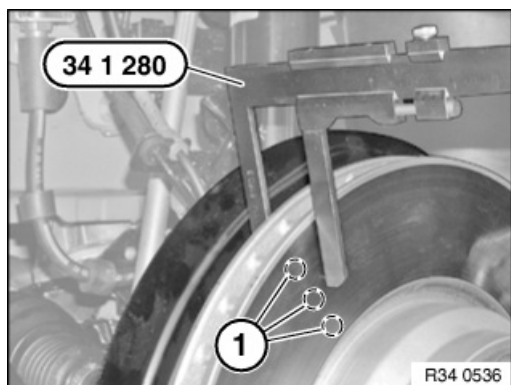
Attention!

Changed expanding springs (1) are installed influently!

The cross web (2) must be as shown below!

Installation note:

Insert the lower retaining pin first, align the expanding spring and then insert the upper retaining pin.



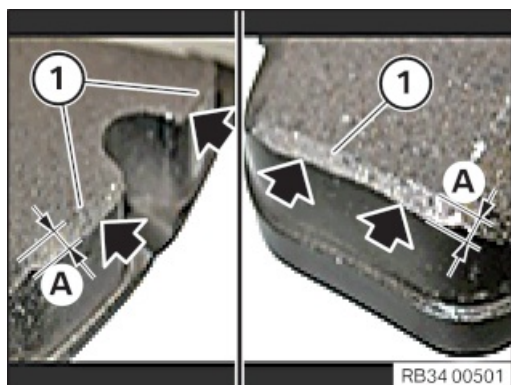
Check minimum brake disc thickness:

- Position special tool 34 1 280 at three measuring points in area (1) and measure.
- Compare measuring result and lowest value with setpoint value.



Attention!

New brake pads may only be fitted if the brake disk thickness is greater than the minimum brake disk thickness.

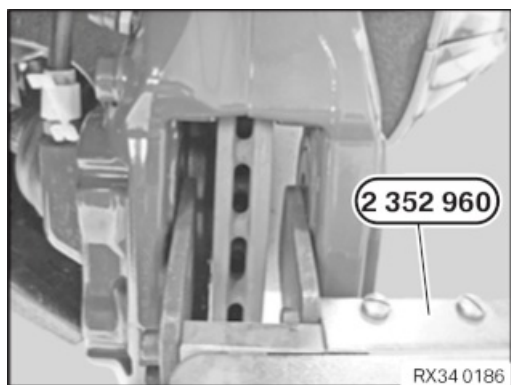


Attention!

If new brake pads are mounted on a brake disc, the following must be observed:

- Bevel edges in the area (1) slightly (dimension A must not exceed maximum 1 mm).

These procedures applies for all the following described brake systems.

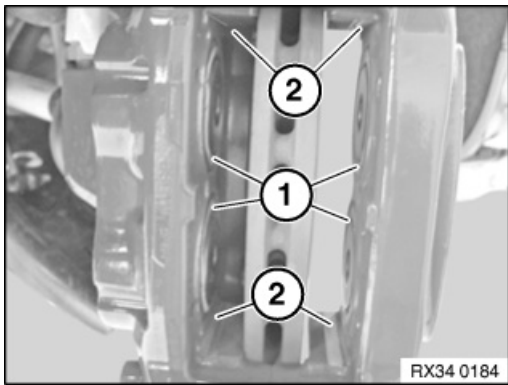


Press brake piston fully back with special tool 34 1 050 .**Attention!**

When pressing piston back, note brake fluid level in expansion tank.

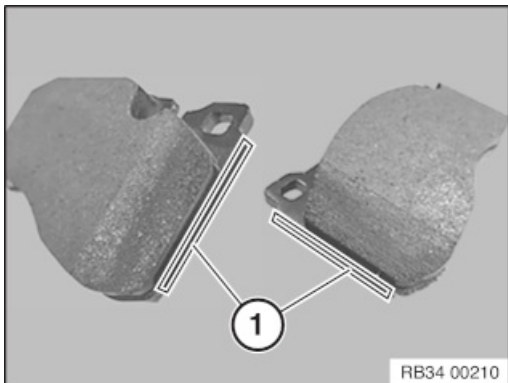
Overflowing brake fluid will damage the paintwork.





Check dust boot (1) for damage and replace if necessary.

Clean brake caliper compartments (2) and apply a thin coating of brake pad paste.



Lightly coat the brake pad contact surface on both sides in area (1) with brake pad paste.



Note:

After completing repair work:

- Fully depress brake pedal several times so that brake pads contact brake discs.
- When installing new brake pads at front and rear axles, brake fluid level must be brought up to "MAX" marking.
- Read and comply with notes on braking in new brake discs / brake pads.
- If necessary, when replacing brake pads, reset CBS display as per factory specification.

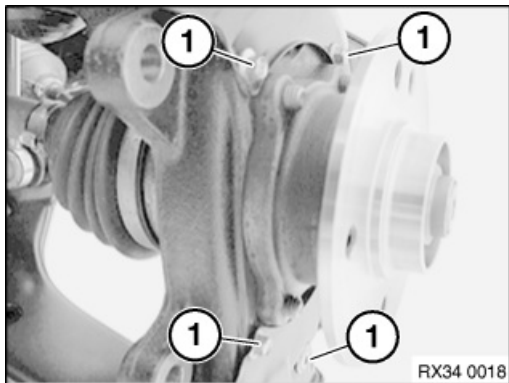


34 11 250 Removing and installing/replacing front left or right brake anchor plate/protective plate



Necessary preliminary work:

- Remove front brake discs



Release screws (1) and remove brake guard plate at front. *Installation note:*

Tightening torque 34 11 4AZ.

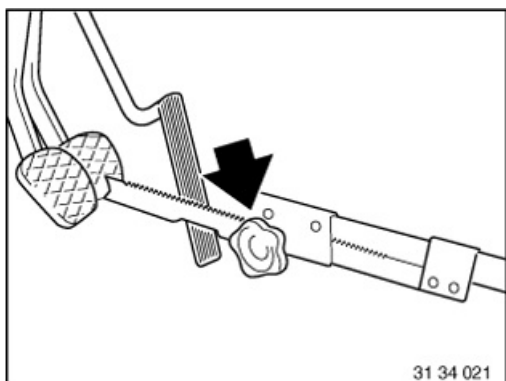


**Necessary preliminary work:**

- Read and comply with General Information.
- Remove front left or right wheel

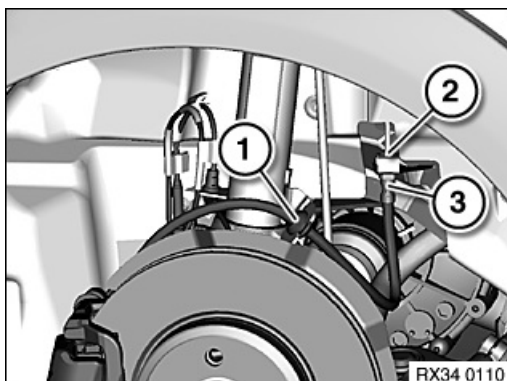
Note:

After completing tasks, bleed brake system.



Press brake pedal down to floor and secure with pedal support. *Note:* The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.



Pull brake hose out of holder (1).

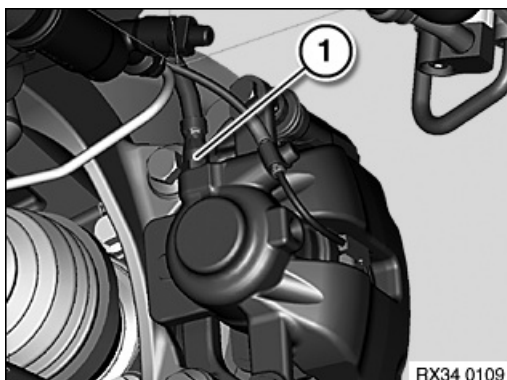
Important!

Grip brake hose at square head (3) to prevent connecting piece from turning in retaining bracket.

Disconnect brake hose from brake line (2).

Installation note:

Tightening torque 34 32 1AZ.



Detach brake hose from brake calliper (1). *Installation note:* Tightening torque 34 32 2AZ.



**Important!**

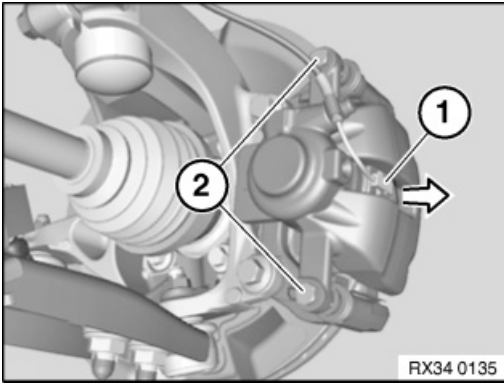
Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

Note:

First tighten brake hose on brake calliper.

Move wheels into straight-ahead position.

Insert brake hose in bracket and screw onto brake pipe.



Pull brake lining wear sensor (1) out of brake lining (left side only).

Unscrew guide bolts (2).

Detach brake calliper in direction of arrow.

Installation note:

Replace guide bolts.

Tightening torque 34 11 3AZ.

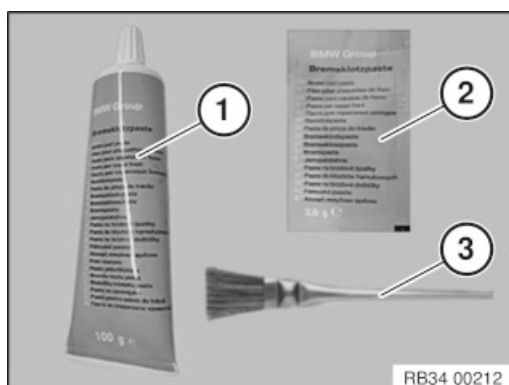




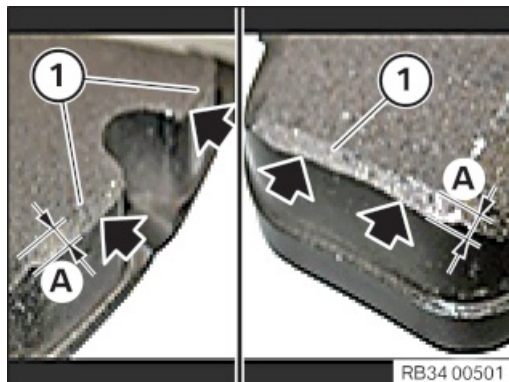
Attention!

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket, but rather clean with brake cleaner BMW TI. Clean number 83 19 2 154 780 and apply a thin coating of BMW TI brake pad paste. Coat number 83 19 2 158 851 (3 gr.) or 83 19 2 158 852 (100 gr.).

Spread brake pad paste onto the marked surfaces using a brush!



- (1) Brake pad paste 100 gr. BMW TI. Number 83 19 2 158 852
- (2) Brake pad paste 3 gr. BMW TI. Number 83 19 2 158 851
- (3) Brush for spreading brake pad paste over the marked areas.



Attention!

If new brake pads are mounted on a brake disc, the following must be observed:

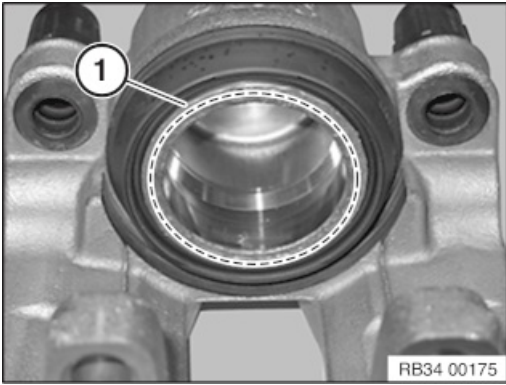
- Bevel edges in the area (1) slightly (dimension A must not exceed maximum 1 mm).

These procedures applies for all the following described brake systems.

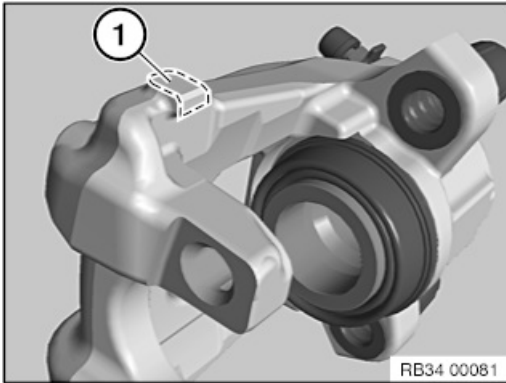


IPS brake (made by CBI), 1-piston floating caliper brake (model ranges: 1-Series, 3-Series, 4-Series, X3)

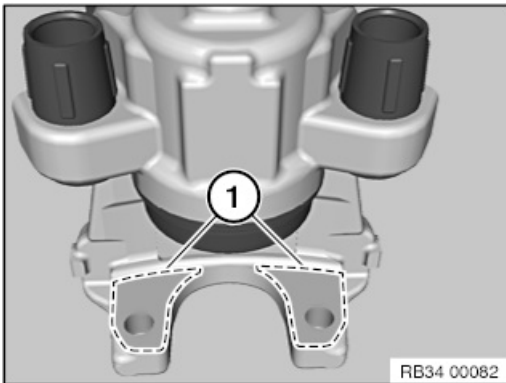




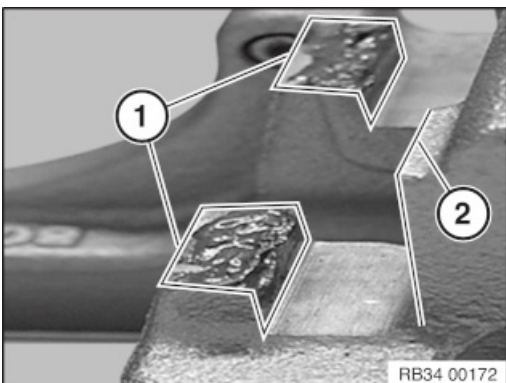
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.



Clean contact surfaces (1) of T-heads/brake calliper housing with brake cleaner and apply a thin coating of brake pad paste.

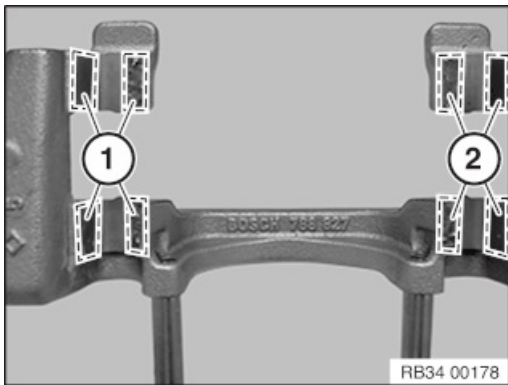


Clean contact surface (1) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.

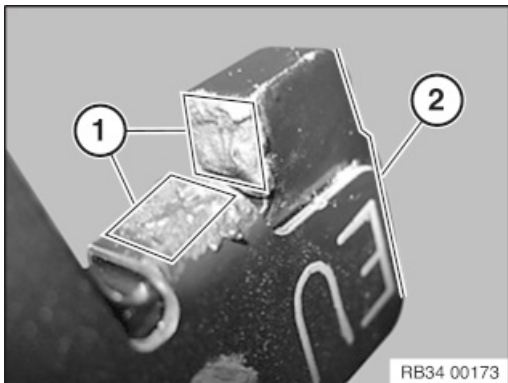


So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1) for the brake pads on the brake caliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.

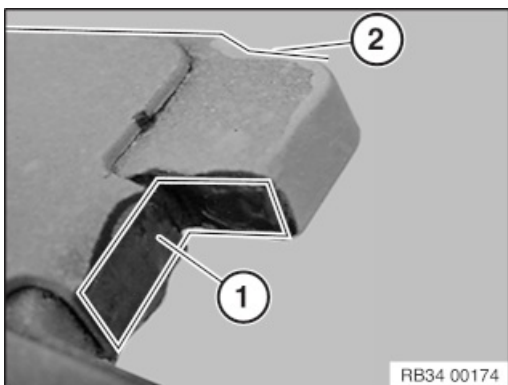




So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1 and 2) for the brake pads on the brake calliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.



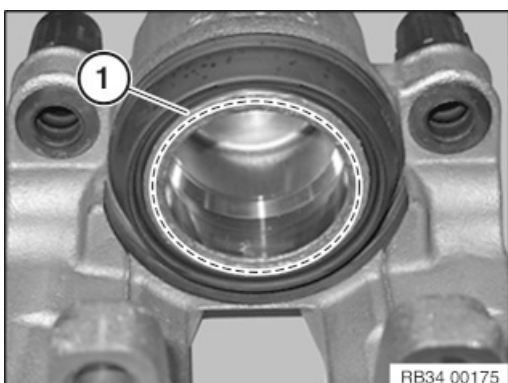
Apply a thin coating of brake pad paste to T-head of inner brake pad in area (1) and (2).



Apply a thin coating of brake pad paste to T-head of outer brake pad in area (1) and (2).

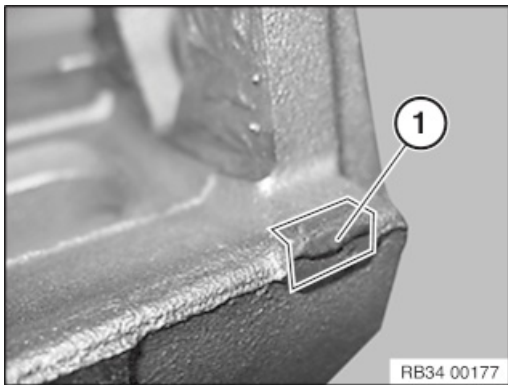


FN brake (made by Continental Teves), 1-piston floating caliper brake (model ranges: 5-Series, 6-Series, 7-Series, 8-Series, X1, X3, X5, Z4, Rolls-Royce)

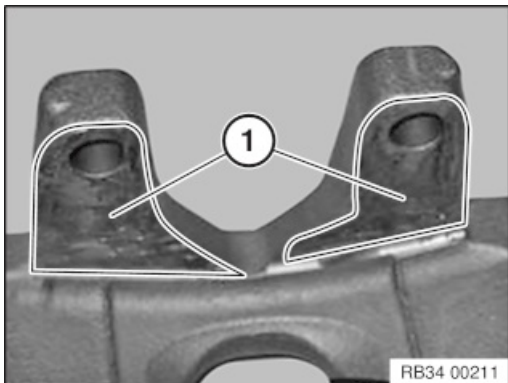


Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

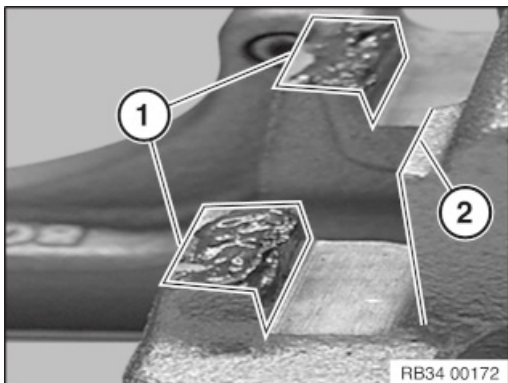




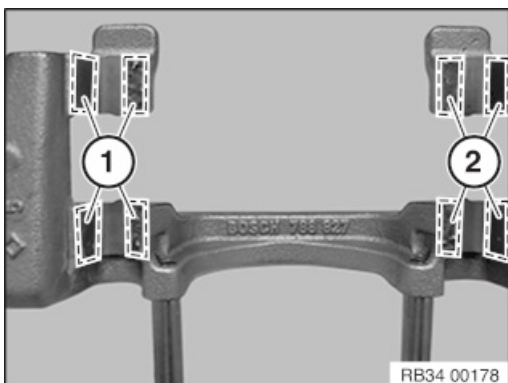
Clean contact surfaces (1) of T-heads/brake calliper housing with brake cleaner and apply a thin coating of brake pad paste.



Clean contact surface (1) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.

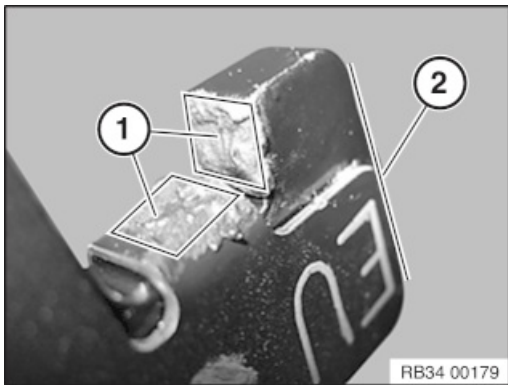


So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1) for the brake pads on the brake caliper mounting bracket. Clean guide surfaces (1) with brake cleaner and apply a thin coating of brake pad paste.

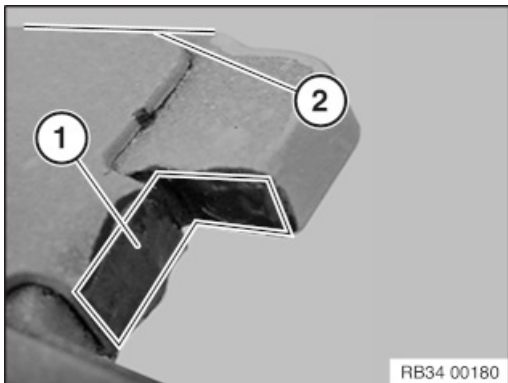


So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1 and 2) for the brake pads on the brake caliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.





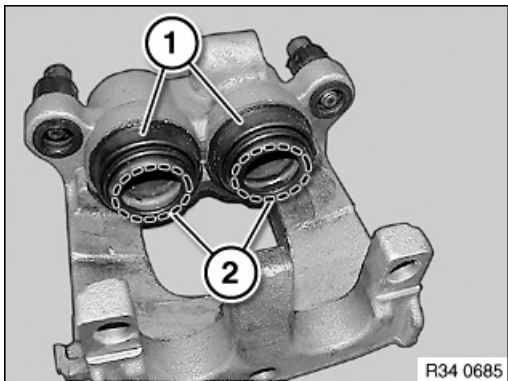
Lightly coat the T-head of the inner brake pad with brake pad paste in area (1 and 2).



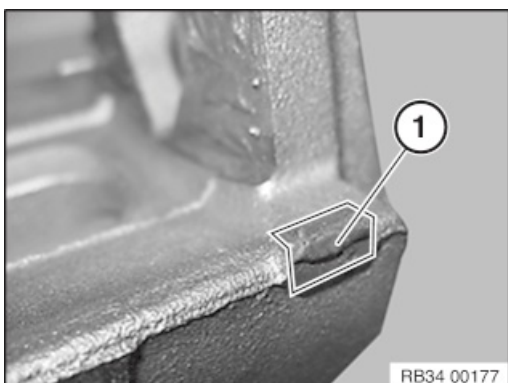
Lightly coat the T-head of the outer brake pad with brake pad paste in area (1 and 2).



FN brake (made by Continental Teves), 2-piston floating caliper brake (model ranges: 5-Series, 6-Series, 7-Series, 8-Series, X5, Rolls-Royce)

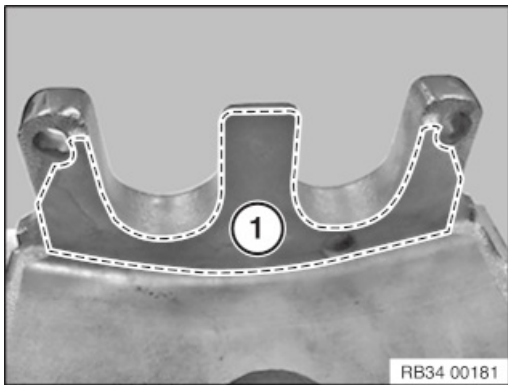


Clean contact surface (2) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

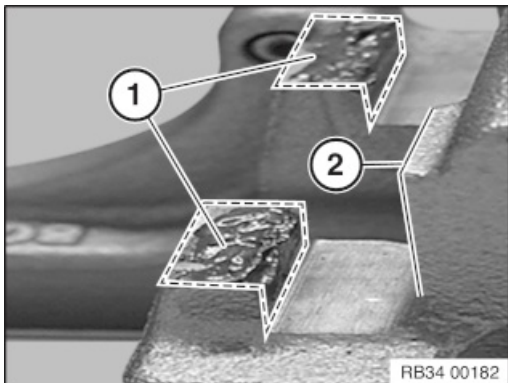


Clean contact surfaces (1) of T-heads/brake calliper housing with brake cleaner and apply a thin coating of brake pad paste.

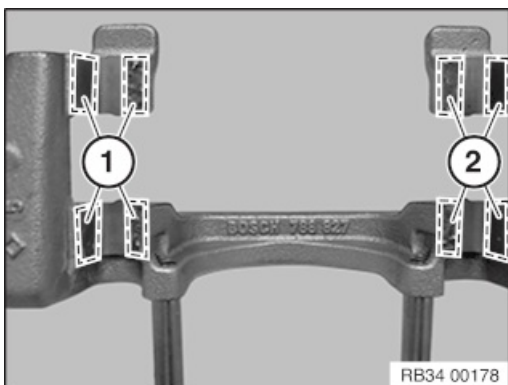




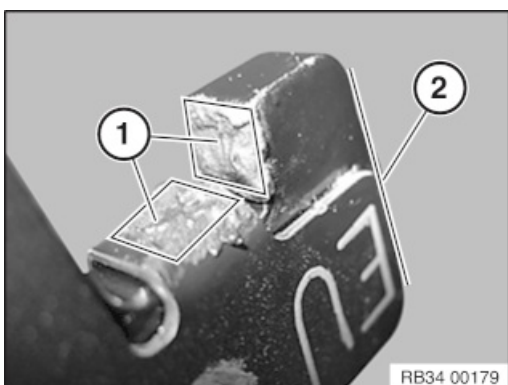
Clean contact surface (1) and brake caliper with brake cleaner and apply a thin coating of brake pad paste.



So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1 and 2) for the brake pads on the brake calliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.

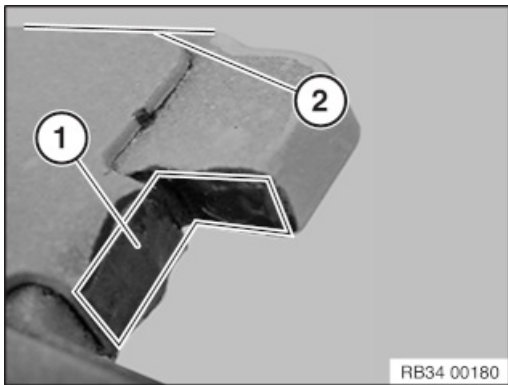


So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1 and 2) for the brake pads on the brake calliper mounting bracket. Clean guide surfaces (1 and 2) with brake cleaner and apply a thin coating of brake pad paste.



Lightly coat the T-head of the inner brake pad with brake pad paste in area (1 and 2).

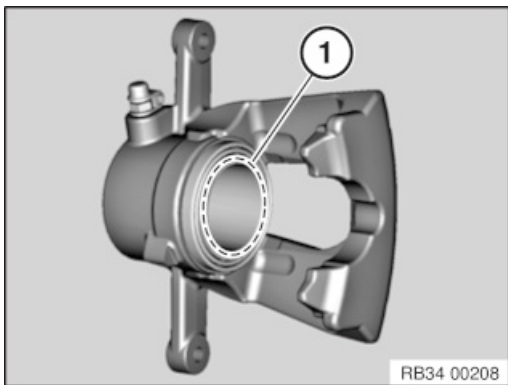




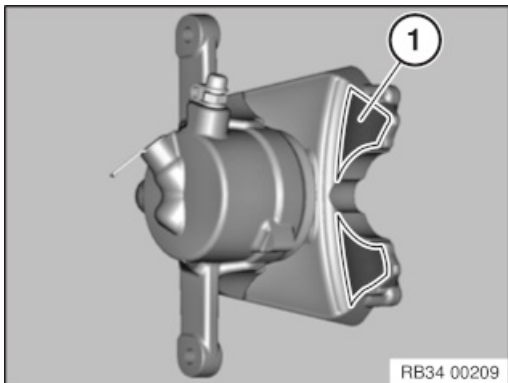
Lightly coat the T-head of the outer brake pad with brake pad paste in area (1 and 2).



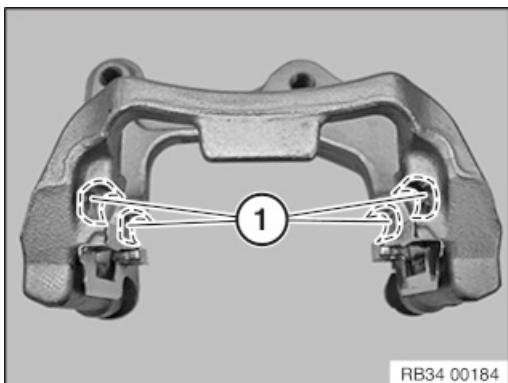
Collette brake (made by TRW), 1-piston brake caliper (model ranges: MINI, 1-Series, 5-Series, 6-Series, Z4)



Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

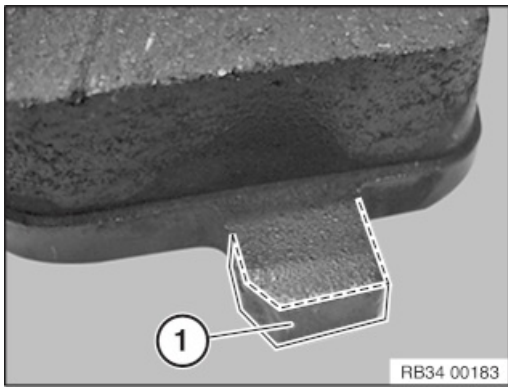


Clean contact surface (1) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.



So as not to damage the surface coating, if possible do not mechanically clean the guide surface (1) for the brake pads on the brake caliper mounting bracket. Clean guide surface (1) with brake cleaner and apply a thin coating of brake pad paste.

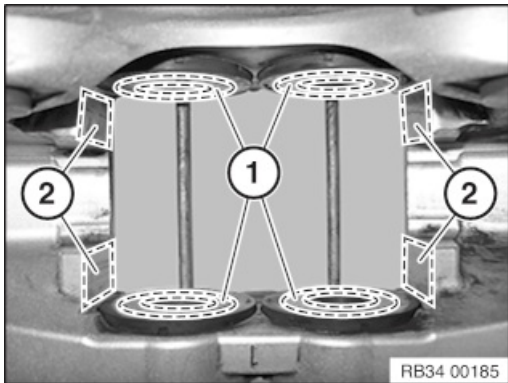




Apply a thin coating of brake pad paste to both sides of T-head of brake pad in area (1).



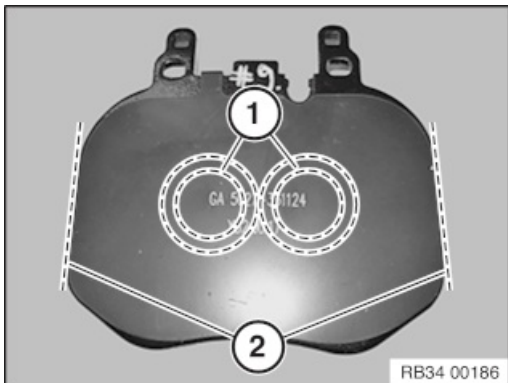
P 4.40 brake (made by Brembo), 4-piston fixed caliper brake (model ranges: MINI, 1-Series, 3-Series, 4-Series, 5-Series, 6-Series, 7-Series, 8-Series, X5, Rolls-Royce)



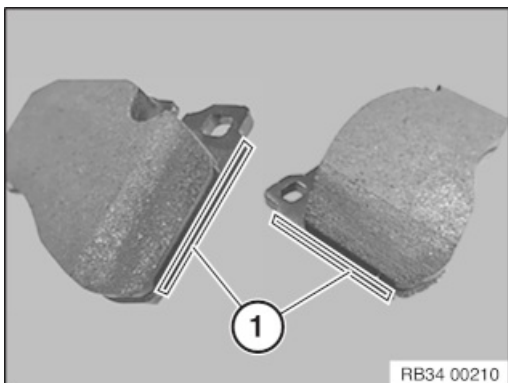
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (2) for the brake pads on the brake calliper mounting bracket. Clean guide surface (2) with brake cleaner and apply a thin coating of brake pad paste.

Clean both inner and outer guide surfaces (2) and apply a thin coating of brake pad paste.



Lightly coat both sides of the contact surface in area (1 and 2) with brake pad paste.

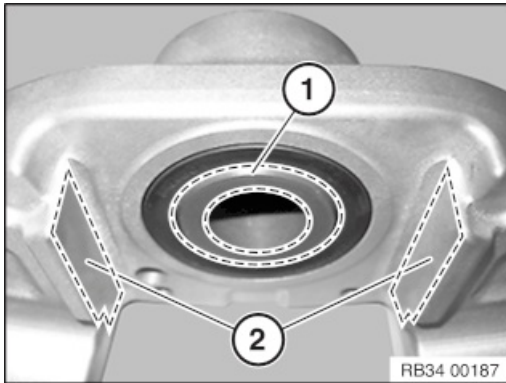


Lightly coat the brake pad contact surface on both sides in area (1) with brake pad paste.





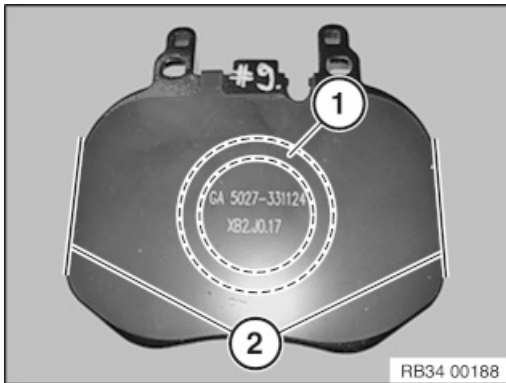
P 4.40 brake (made by Brembo), 2-piston fixed caliper brake (model ranges: 1 Series, 2 Series, 3 Series; does not apply to M2 F87)



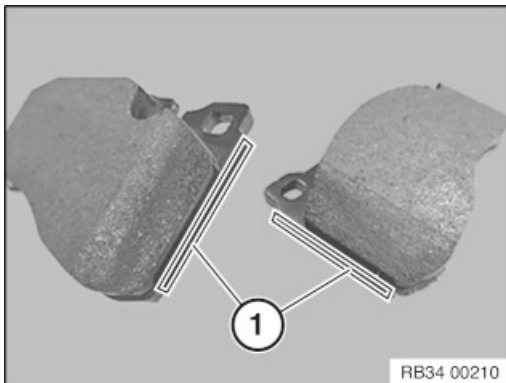
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (2) for the brake pads on the brake calliper mounting bracket. Clean guide surface (2) with brake cleaner and apply a thin coating of brake pad paste.

Clean both inner and outer guide surfaces (2) and apply a thin coating of brake pad paste.



Lightly coat both sides of the contact surface in area (1 and 2) with brake pad paste.

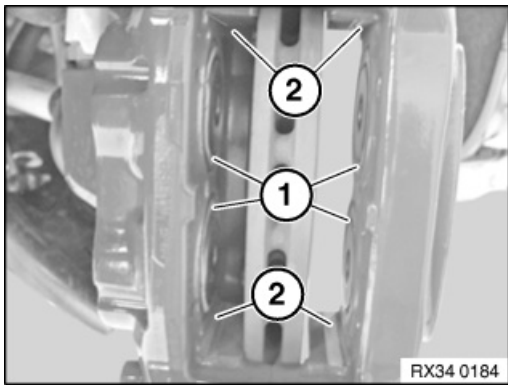


Lightly coat the brake pad contact surface on both sides in area (1) with brake pad paste.



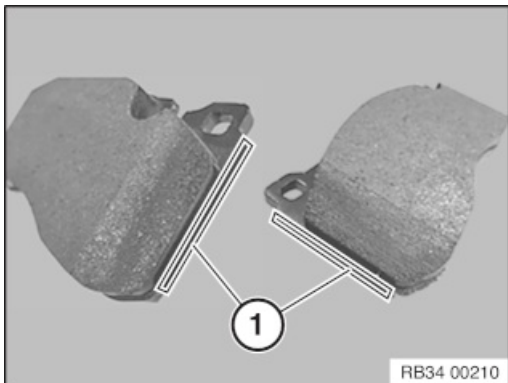
Brake (made by Brembo), 4-piston fixed caliper brake (model ranges: MINI F5x sport brake)





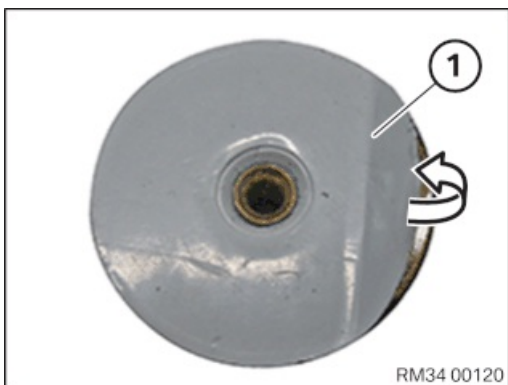
Check dust boot (1) for damage and replace if necessary.

Clean brake caliper compartments (2) and apply a thin coating of brake pad paste.



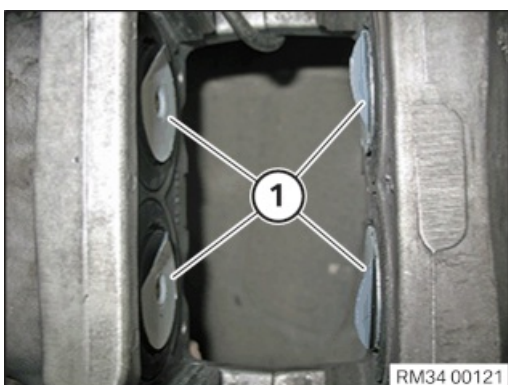
Lightly coat the brake pad contact surface on both sides in area (1) with brake pad paste.

Do not grease the brake lining backplate and thoroughly clean it with brake cleaner!



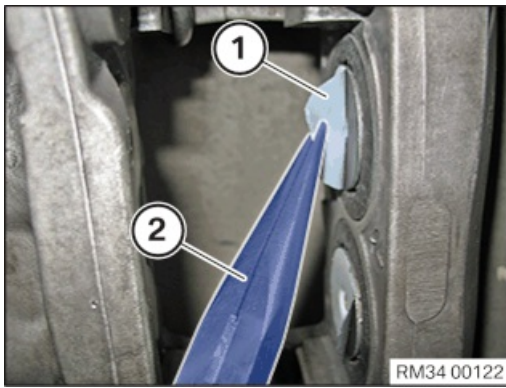
Only use new claw plates!

Slightly raise the protective film (1) at a place.

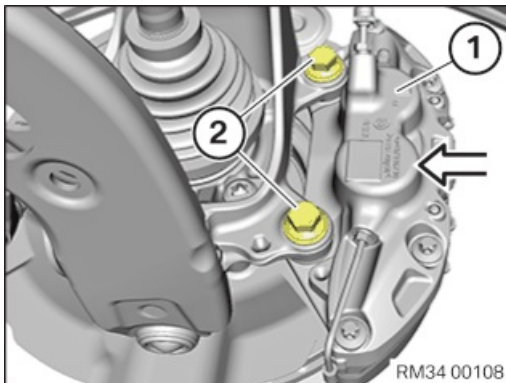


Insert the claw plates (1) into the brake pistons.





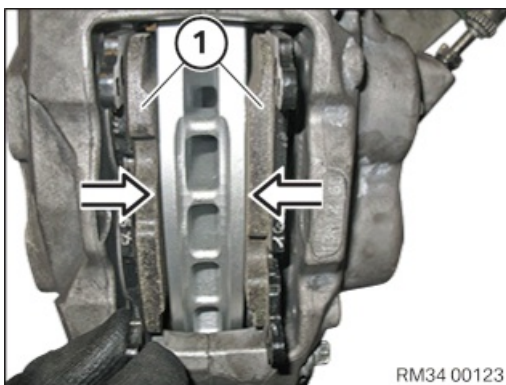
Pull off the protective film (1) with long-nose pliers (2). **Attention!**
The bonding surface of the claw plates must not be touched!



Install the brake caliper (1) in direction of arrow.

Parts: Replace screws (2).

Insert screws (2) and tighten.



Install the brake pad (1). **Attention!**

The brake pads must not touch the bonding surface of the claw plates when inserting!

Apply the brake pads to the brake disc and insert.



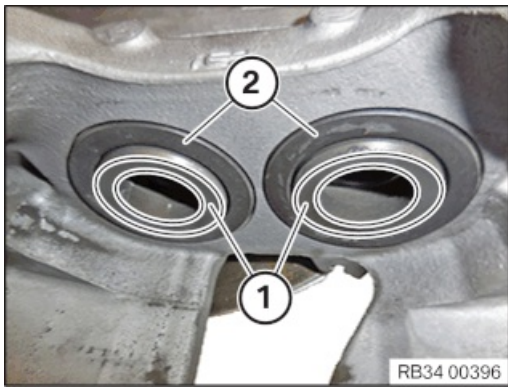
In order to ensure a complete bonding of the claw plates with the brake pads, the following instruction must be strictly adhered to:

Strongly press the brake pedal and hold it for at least 1 min!



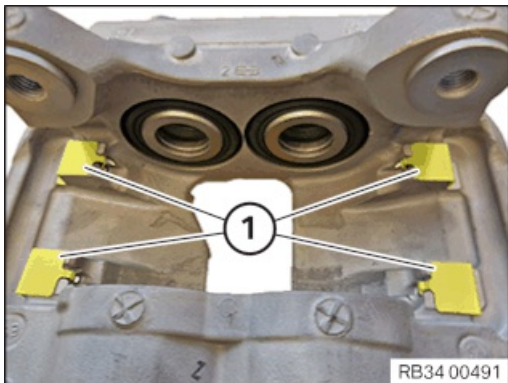
Brake (made by Continental), 4-piston fixed caliper brake (model ranges: 7-Series (G11, G12))





Clean the contact surface (1) of the brake piston (4 pieces) with brake cleaner.

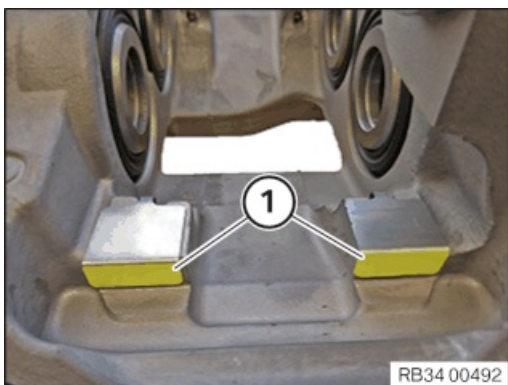
Check the dust boots (2) and renew as necessary.



Always renew retaining plates 1!

Mount retaining plate 1.

It is paramount that the slide panels are correctly positioned in the guides!

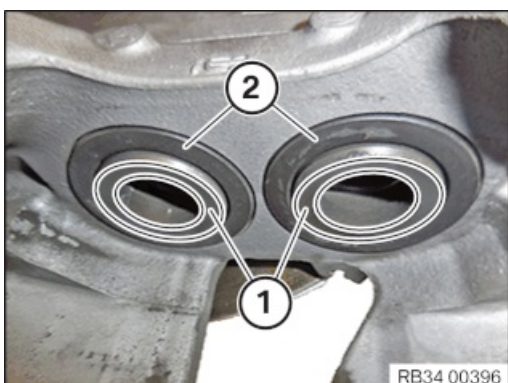


So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket.

Apply a thin layer of brake pad paste to the surfaces of the sliding plates (1).



Brake (made by Brembo), 4-piston fixed caliper brake (model ranges: 7-Series (G11, G12))

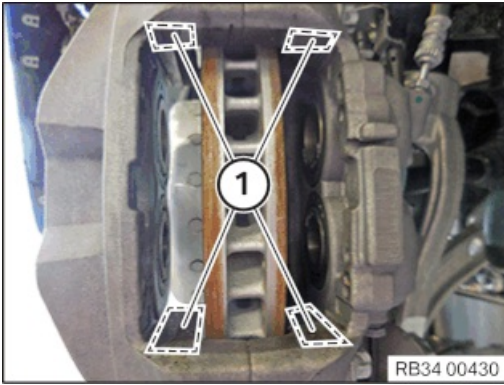


Clean the contact surface (1) of the brake piston (4 pieces) with brake cleaner.

Adhesive residues must be completely removed.

Check the dust boots (2) and renew as necessary.





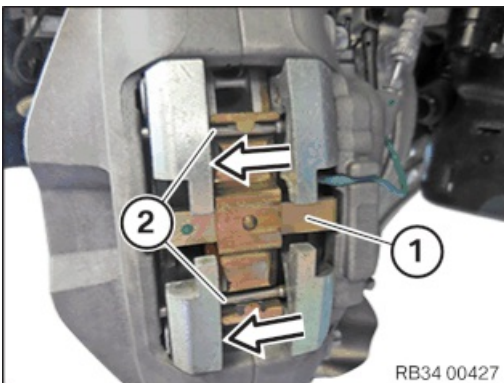
To prevent damage to the surface coating, do not clean the guide surfaces (1) for the brake pads on the brake calliper mechanically, if possible.

Clean guide surfaces (1) with brake cleaner and apply a thin coating of brake pad paste.



Remove the protective film of the adhesive layer (1) from the brake pads.

Do not touch the adhesive layer!



Insert brake pads in the brake caliper, making sure the adhesive layer does not touch the brake pistons.

Fit retaining clip (1).

Drive in the locking pins (2) in the direction of the arrow.

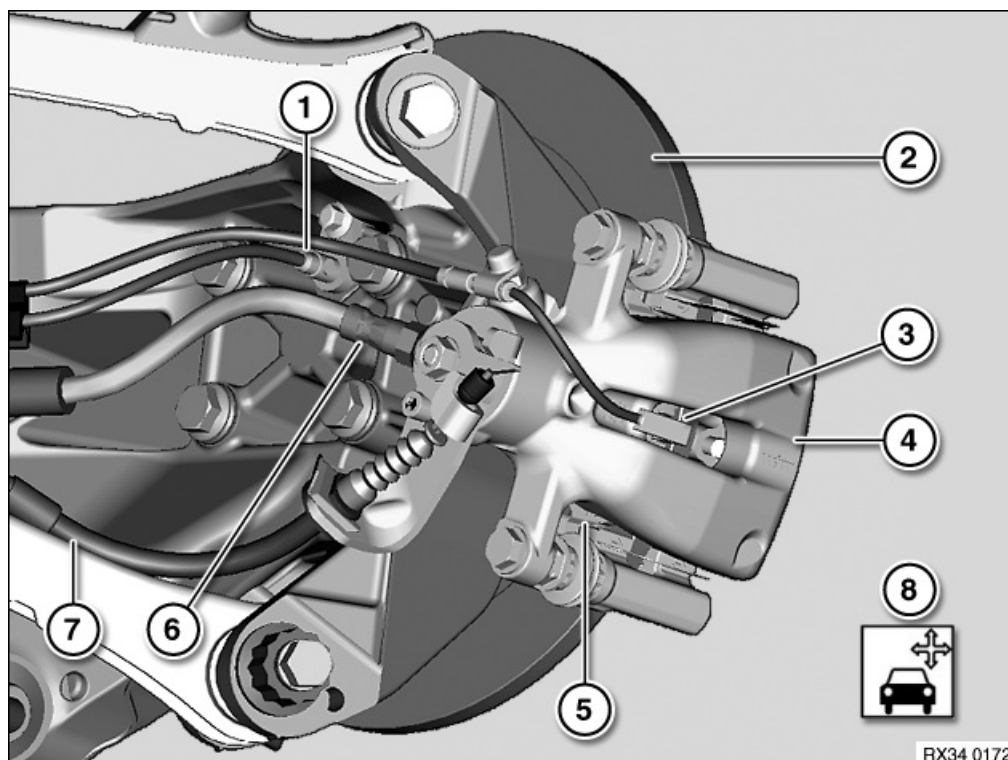
Attention!

After the brake pads have been installed they must immediately be bonded to the brake pistons:

- Step on the brake pedal to the floor and hold the pressure for one minute. This causes the brake pads to adhere to the brake pistons.



34 21 ... Overview of rear brakes



- | | |
|---------------------------|-----------------|
| 1 Pulse generator, rear | 2 Brake discs |
| 3 Brake-pad wear sensor | 4 Brake caliper |
| 5 Brake pads | 6 Brake hose |
| 7 Handbrake Bowden cables | 8 Testing |



**Special tools required:**

- 34 1 280

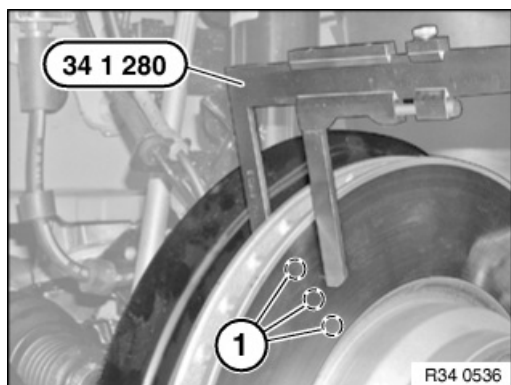
**Important!**

Always replace brake discs in pairs.

New brake pads must always be fitted when replacing the brake discs.

Necessary preliminary tasks:

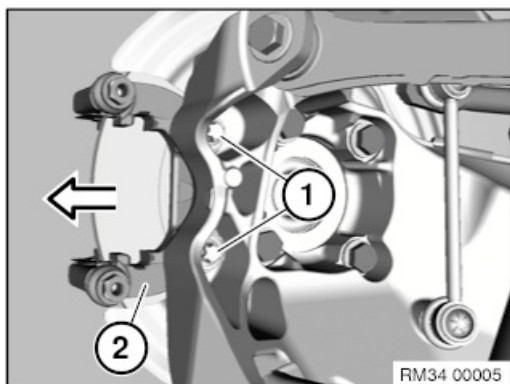
- Remove rear brake pads.

**Check minimum brake disc thickness:**

- Position special tool 34 1 280 at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with setpoint value.

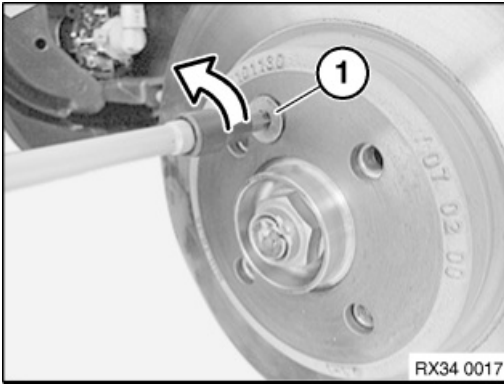
**Important!**

New brake pads may only be fitted if the brake disc thickness is greater than the minimum brake disc thickness (MIN TH).



Release screws (1) and remove holder (2). *Installation note:*
Tightening torque 34 21 2AZ.



**Important!**

When removing the brake disc: On no account strike the friction ring with a hammer or similar object! If necessary, carefully tap with a rubber mallet against the brake disc chamber.

Release mounting bolt (1).

Remove brake disc.

Installation note:

Replace screw.

Tightening torque 34 21 1AZ.

Clean contact surface of wheel hub thoroughly and remove any traces of rust if necessary.

Irregularities in the contact surface can cause distortion in the brake disc!





Special tools required:

- 34 1 280
- 34 6 306
- 34 6 307
- 34 6 308
- 34 6 309
- 2 294 516



Attention!

- **Brake pad wear sensor:** After removal it must be replaced (brake pad wear sensor loses its retention capability in the break pad).
- **Retaining pins and expanding spring:** for vehicles older than 48 months it is recommended to replace the retaining spring!

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket, but rather clean with brake cleaner BMW TI. number 83 19 2 154 780 and apply a thin coating of brake pad paste BMW TI. number 83 19 2 158 851 (3 gr.) or 83 19 2 158 852 (100 gr.).

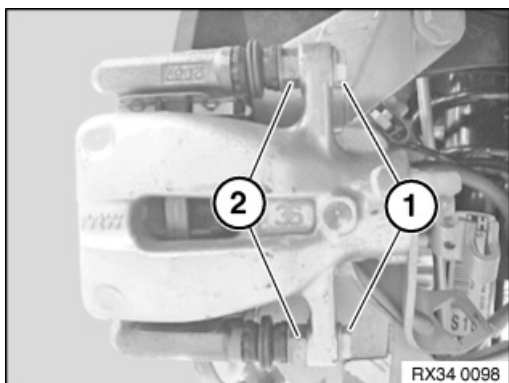
Spread brake pad paste onto the marked surfaces using a brush!

Observe guideline for applying brake pad paste on brake pads and brake anchor plate!



Necessary preliminary tasks:

- Remove wheels.
- Remove brake pad wear sensor



Attention!

Both guide bolts must be released and then the brake caliper detached towards the rear!

The springs may be bent when only one bolt is released and the brake caliper is folded up!

Unscrew guide bolts (1).

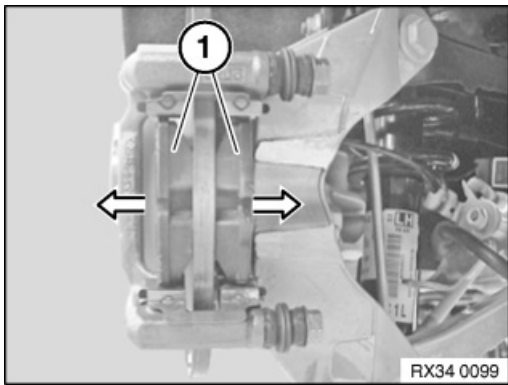
If necessary, grip at hexagon head (2).

Installation note:

Replace guide bolts.

Tightening torque 34 21 3AZ.





Attention!

Mark any worn brake pads.

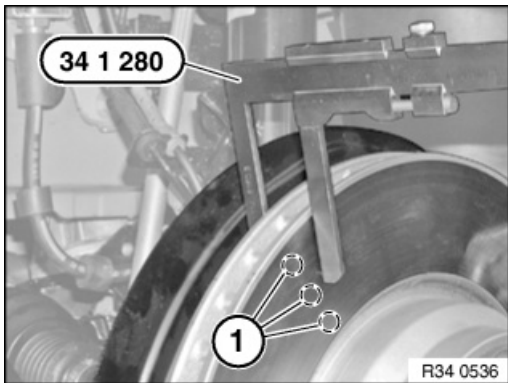
In the event of one-sided brake pad wear, do not change brake pads round.

Remove brake pads (1) in direction of arrow from caliper carrier.

Observe minimum thickness of brake pads.

Clean brake pads.

Do not apply grease to brake lining backplate.



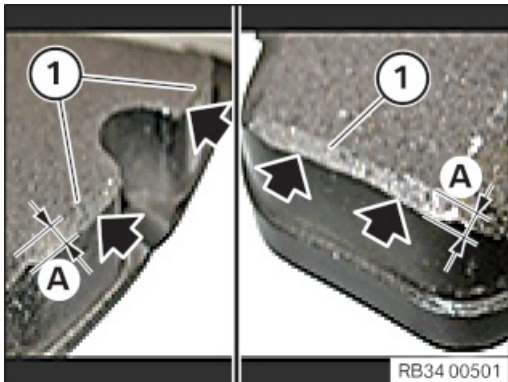
Check minimum brake disc thickness:

- Position special tool 34 1 280 at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with setpoint value.



Attention!

New brake pads may only be installed if the brake disc thickness is greater than the minimum brake disc thickness.

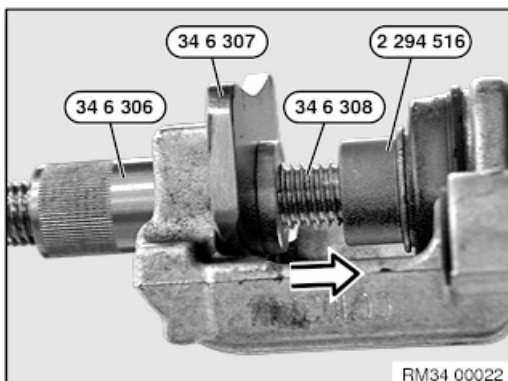


Attention!

If new brake pads are mounted on a brake disc, the following must be observed:

- Bevel edges in the area (1) slightly (dimension A must not exceed maximum 1 mm).

These procedures applies for all the following described brake systems.



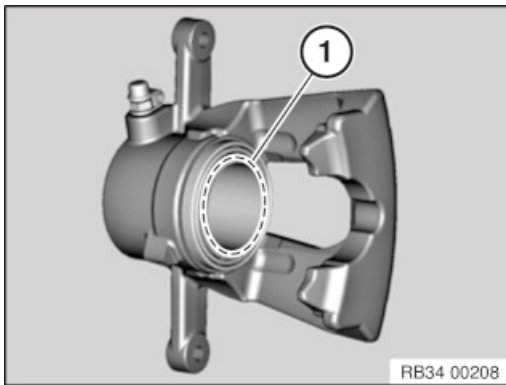
Attention!

When pressing piston back, note brake fluid level in expansion tank.

Overflowing brake fluid will damage the paintwork.

Screw brake piston with special tools 34 6 309 , 34 6 306 , 34 6 307 , 2 294 516 into brake caliper.



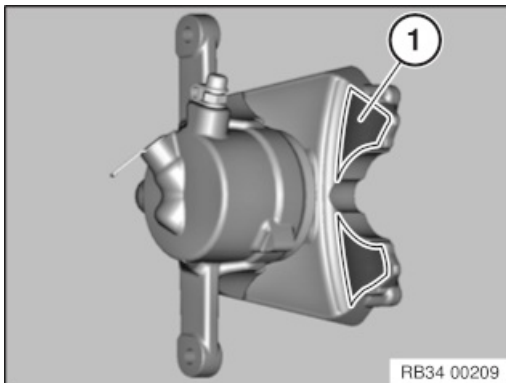


Attention!

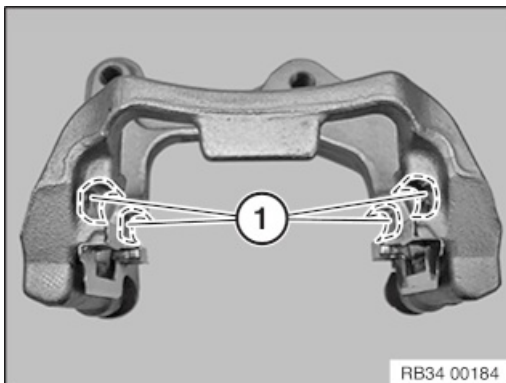
Dust boot must not come into contact with brake pad paste as this may cause the dust boot to swell.

Check dust boot for damage and renew if necessary.

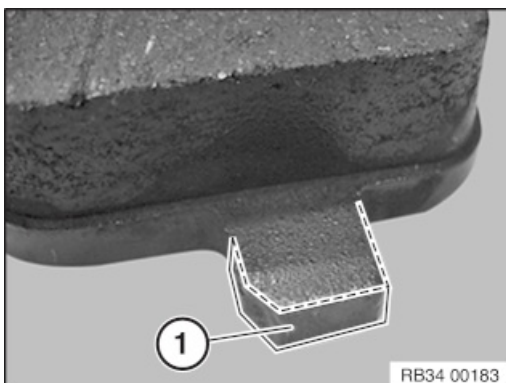
Clean contact surface (1) of brake piston with brake cleaner and apply a thin coating of brake pad paste.



Clean contact surface (1) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.

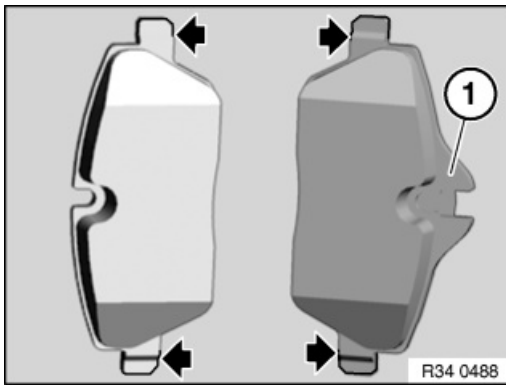


So as not to damage the surface coating, if possible do not mechanically clean the guide surface (1) for the brake pads on the brake caliper mounting bracket. Clean guide surface (1) with brake cleaner and apply a thin coating of brake pad paste.



Apply a thin coating of brake pad paste to both sides of T-head of brake pad in area (1).





Attention!

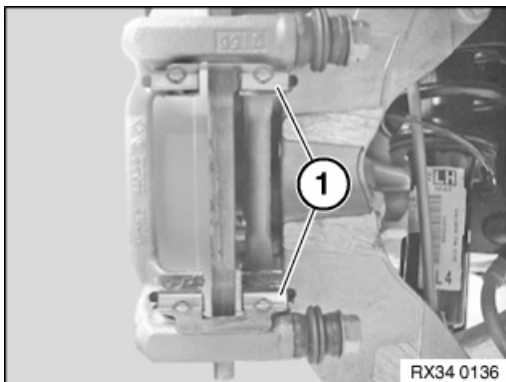
Brake pad with bulge (1) is intended for accommodating the brake pad wear sensor and must be fitted on the piston side.



Attention!

After completing work:

- When installing new brake pads at front and rear axles, brake fluid level must be brought up to "MAX" mark.
- Read and comply with notes on braking in new brake discs / brake pads.
- Fully depress brake pedal several times so that brake pads contact brake discs.
- If necessary, when replacing brake pads, reset CBS display as per factory specification.



Replacement:

Remove lining springs (1) and replace.

Installation note:

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces (1) for the brake pads on the brake caliper mounting bracket. Instead, clean with brake cleaner and apply a thin coating of brake pad paste.

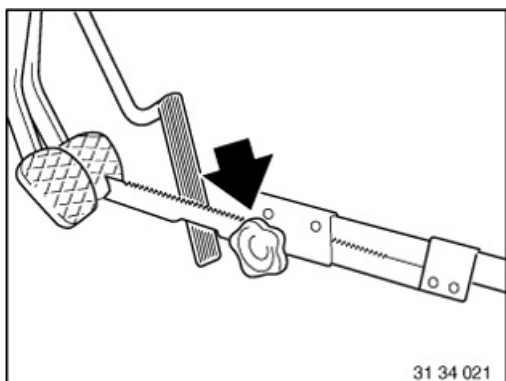


**Necessary preliminary work:**

- Read and comply with General Information.
- Remove rear left or right wheel

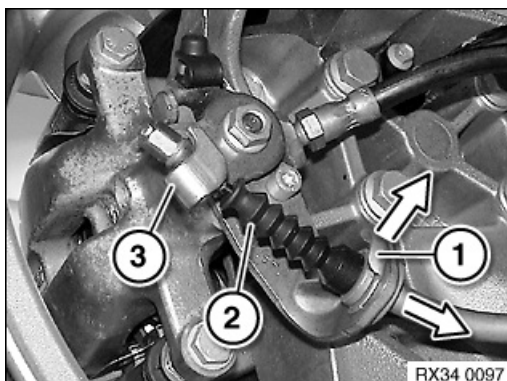
Note:

After completing tasks, bleed brake system.



Press brake pedal down to floor and secure with pedal support. *Note:* The pedal support may only be released when the brake lines are reconnected.

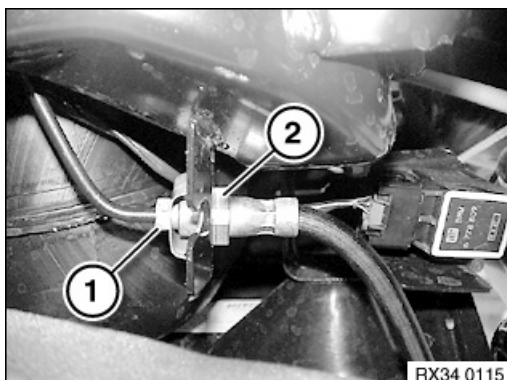
This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.



Detach locking clip (1) in direction of arrow.

Disengage parking brake Bowden cable (2) from actuating lever (3) at brake calliper.

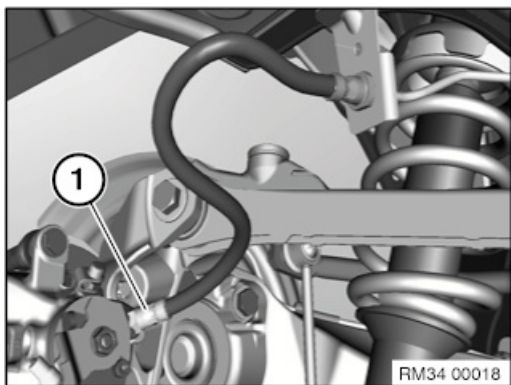
Feed out parking brake Bowden cable (2) downwards.

**Important!**

Grip brake hose at square head (2) so that connecting piece cannot rotate in retaining bracket.

Disconnect brake hose from brake line (1). *Installation note:* Tightening torque 34 32 1AZ.





Detach brake hose (1) from brake calliper. *Installation note:*
Tightening torque 34 32 3AZ.



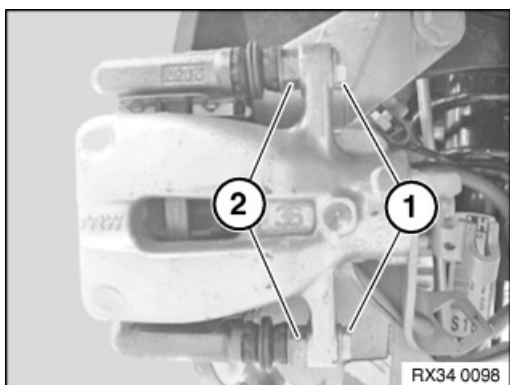
Important!

Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

Note:

First tighten brake hose on brake calliper.

Insert brake hose in bracket and screw onto brake pipe.



Pull brake lining wear sensor out of brake lining (right side only).

Unscrew guide bolts (1).

If necessary, grip at hexagon head (2).

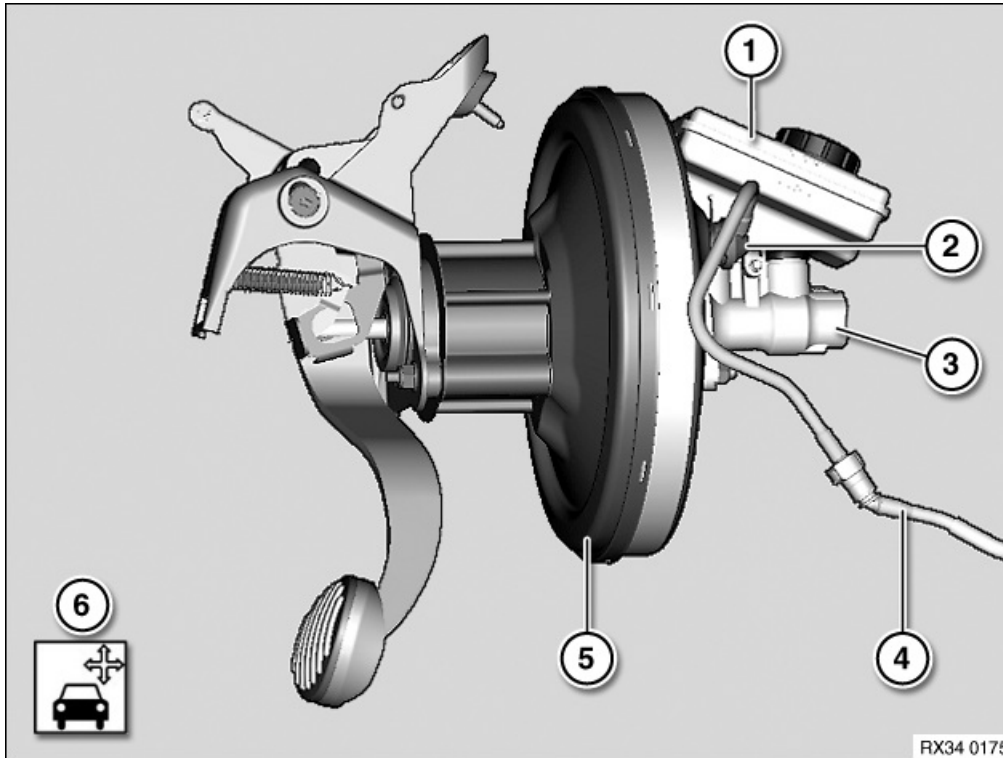
Remove brake calliper.

Installation note:

Replace guide bolts.

Tightening torque 34 21 3AZ.





- | | |
|-------------------------|------------------------|
| 1 Expansion tank | 2 Non-return valve |
| 3 Brake master cylinder | 4 Vacuum hose |
| 5 Brake servo | 6 Bleed braking system |



34 31 181 Removing and installing / replacing expansion tank for hydraulic brake control



Necessary preliminary work:

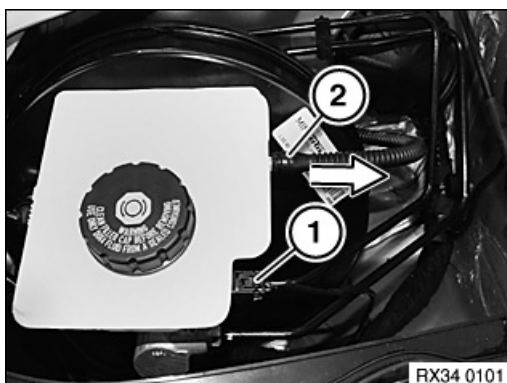
- Read and comply with General Information.
- Remove cover for cowl panel on left

Note:

Extract brake fluid out of expansion tank.

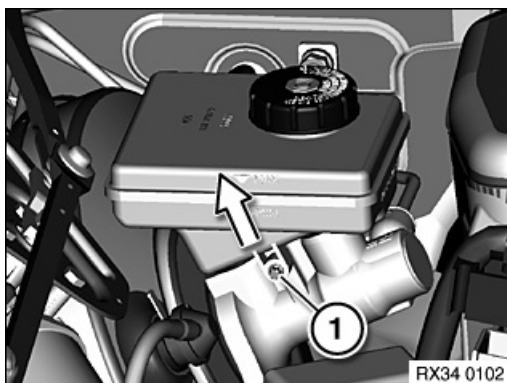
Use a suction bottle used exclusively for drawing off brake fluid.

Do not reuse drawn out brake fluid.



Unlock plug connection (1) and disconnect.

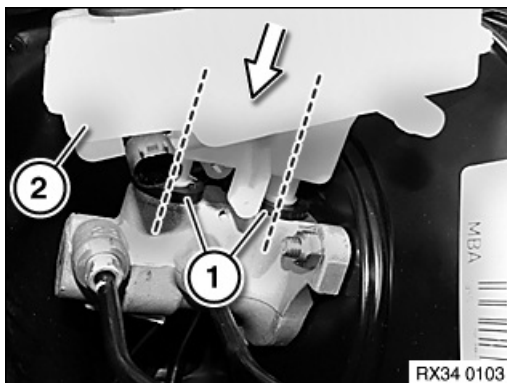
Pull off supply hose (2) of clutch hydraulic system.



Release screw (1) and lift off expansion tank vertically in upward direction.

Installation note:

Tightening torque 34 31 2AZ.



Important!

Check rubber plugs (1) in brake master cylinder for damage and replace if necessary.

Push expansion tank (2) vertically onto the brake master cylinder.



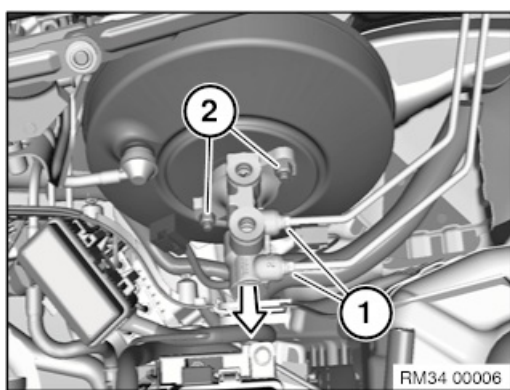
**Special tools required:**

- 32 1 270

**Necessary preliminary work:**

- Remove expansion tank.
- Remove heater end panel.
- Read and comply with General Information.

After completing repair work, bleed brake system with DSC.

**Important!**

Do not bend brake lines.

Close off brake lines and brake master cylinder with seal plugs 32 1 270 .

Unfasten brake lines (1).

Installation note:

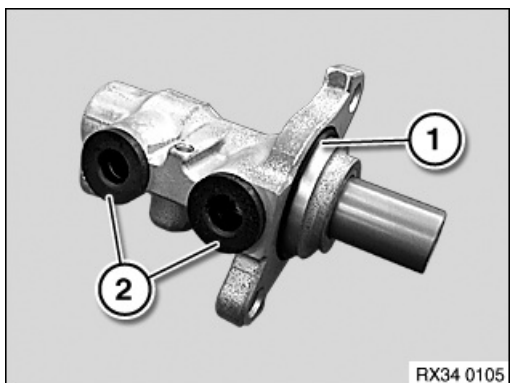
Tightening torque 34 32 1AZ.

Release nuts (2) and feed brake master cylinder out of brake servo.

Installation note:

Replace self-locking nuts.

Tightening torque 34 31 1AZ.

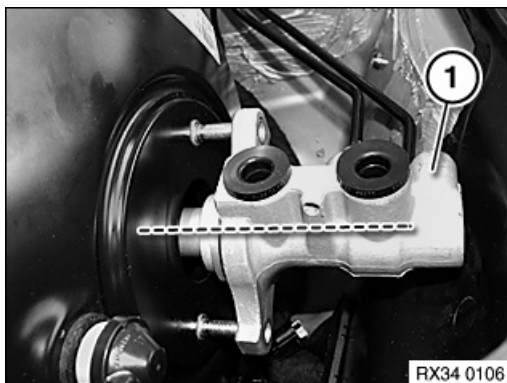


Installation note:

Replace sealing ring (1).

Check rubber plugs (2) and replace if necessary.





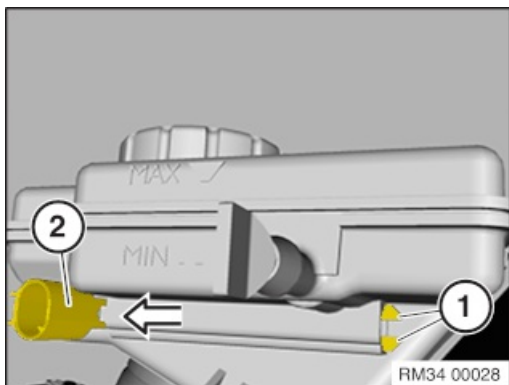
Installation note:

When inserting the brake master cylinder (1) into the brake servo, make sure the pressure rod of the brake servo and the brake master cylinder meet each other on one level.



**Necessary preliminary tasks:**

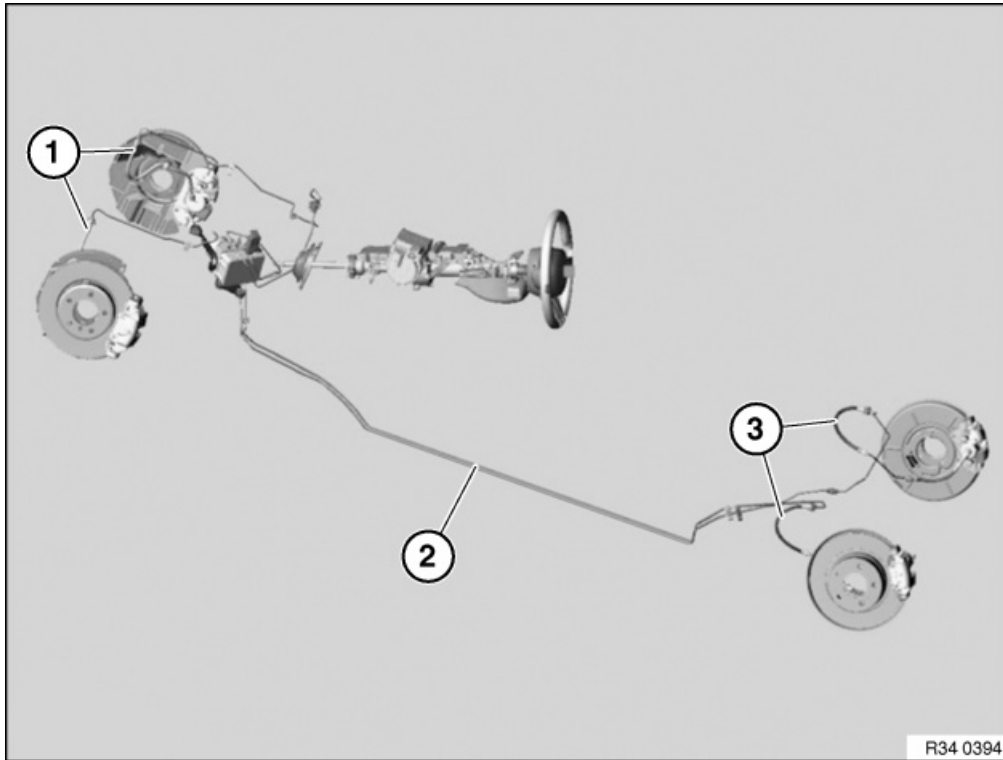
- Read and comply with General Information.
- Remove expansion tank.



Press together retaining lugs (1) and guide out brake fluid switch (2) in direction of arrow. *Installation note:* Make sure retaining lug (1) is engaged correctly.



34 32 ... Overview of brake lines



- 1 Brake hose, front 3 Brake hose, rear
2 Brake pipes



**Special tools required:**

- 34 5 100

*Note:*

The brake lines are only supplied in the straight version and correct length with connecting nipple.

Read and comply with General Information.

After completing work, bleed brake system.

Observe safety instructions on raising the vehicle.



The new brake lines are bent into shape with bending tool 34 5 100 .

Removed brake lines can be used as templates for bending.

Important!

- Protective coating of brake line must not be damaged during bending.
- Do not kink or bend back brake lines.
- Watch distances to rigid and movable vehicle parts.
 - Minimum of 5 mm to vehicle components fixed rigidly to body.
 - Minimum of 10 mm to moving vehicle components.
 - Minimum of 10 mm to vehicle components fixed rigidly to body, if brake line is fastened to moving vehicle components (e.g. axle support).
- Brake lines may not make contact or rub.
- Tighten down brake line couplings with torque wrench.

Installation note:

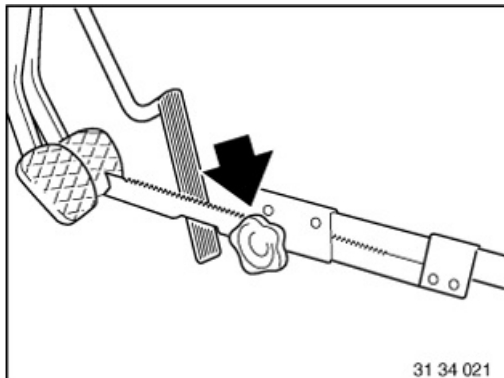
Tightening torque 34 32 1AZ.



**Note:**

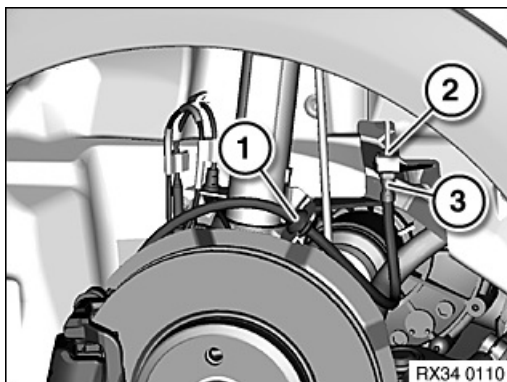
Read and comply with General Information.

After completing tasks, bleed brake system.



Press brake pedal down to floor and secure with pedal support. *Note:* The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.

**Important!**

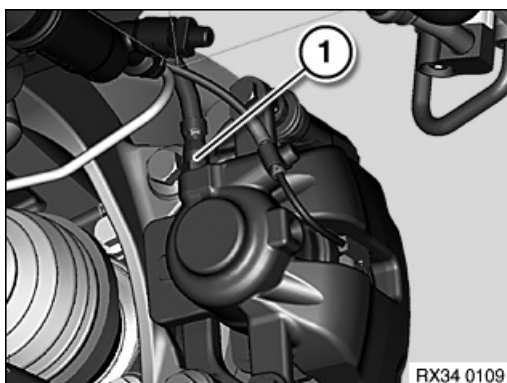
Grip brake hose at square head (3) to prevent connecting piece from turning in retaining bracket.

Pull brake hose out of holder (1).

Disconnect brake hose from brake line (2).

Installation note:

Tightening torque 34 32 1AZ.



Detach brake hose from brake calliper (1). *Installation note:* Tightening torque 34 32 2AZ.

**Important!**

First tighten brake hose on brake calliper.

Move wheels into straight-ahead position.

Insert brake hose in bracket and screw onto brake pipe.

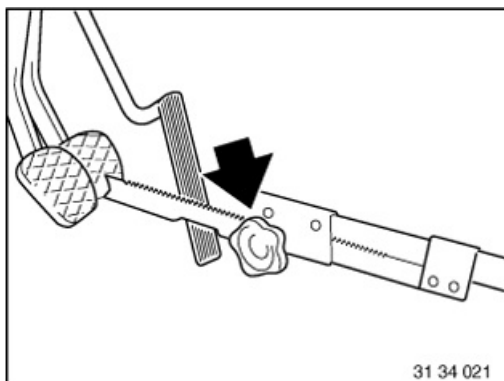
Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.



**Necessary preliminary work:**

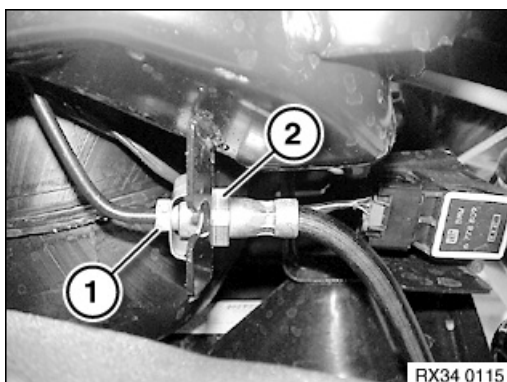
- Read and comply with General Information.
- Partially detach underbody panelling

After completing tasks, bleed brake system.



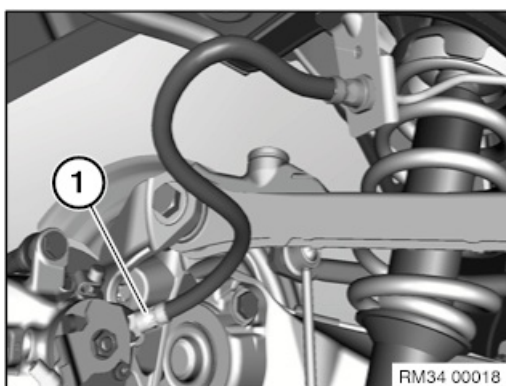
Press brake pedal down to floor and secure with pedal support. *Note:* The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.

**Important!**

Grip brake hose at square head (2) so that connecting piece cannot rotate in retaining bracket.

Disconnect brake hose from brake line (1). *Installation note:* Tightening torque 34 32 1AZ.



Detach brake hose (1) from brake calliper. *Installation note:* Tightening torque 34 32 3AZ.

**Important!**

Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

Note:

First tighten brake hose on brake calliper.

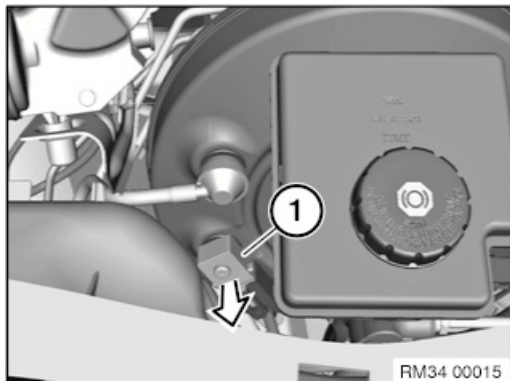
Insert brake hose in bracket and screw onto brake pipe.





**Necessary preliminary work:**

- Remove cowl panel cover.



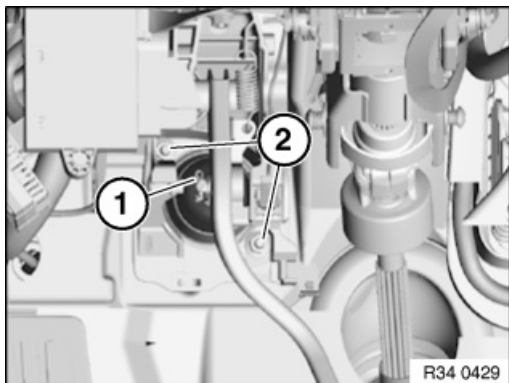
Carefully remove low-pressure sensor (1) from brake servo in direction of arrow.

Disconnect plug connection at low-pressure sensor.



**Necessary preliminary work:**

- Read and comply with General Information.
- Remove brake master cylinder
- Remove left footwell trim



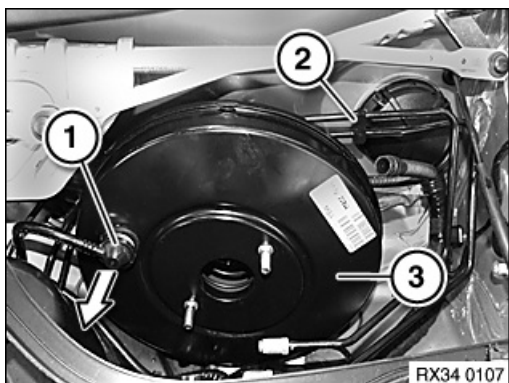
Detach locking clip (1) from brake pedal, disengage and pull out locking pin.

Unscrew nuts (2).

Installation note:

Replace self-locking nuts.

Tightening torque 34 33 1AZ.



Pull non-return valve (1) in direction of arrow out of brake booster.

Unclip brake lines from holder (2).

Important!

Do not use any force when removing and installing the brake unit; the brake unit can be damaged under certain circumstances.

Brake lines must not be bent.

Carefully pull brake booster (3) out of bulkhead and tilt out in upward direction.

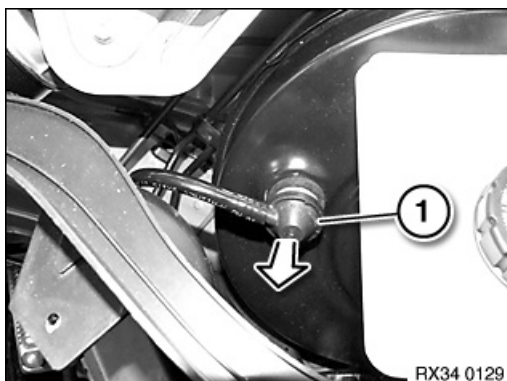


**Necessary preliminary work:**

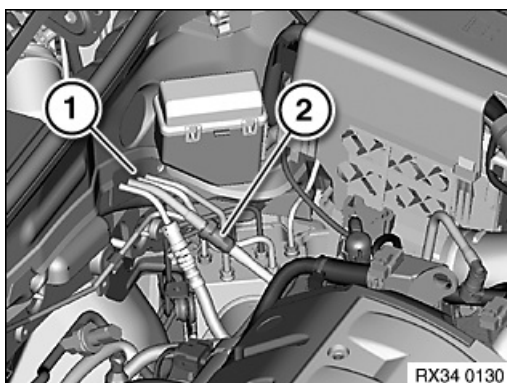
- Remove left cowl panel cover.
- Remove intake silencer housing.

Before beginning repair work, fully press the brake pedal several times to reduce the vacuum pressure in the brake servo. This makes it easier to pull off the vacuum line.

Non-return valve and moulded hose are permanently connected and are replaced together as a single unit.



Remove non-return valve (1) from brake servo. *Installation note:* Check gasket in brake servo and replace if necessary.



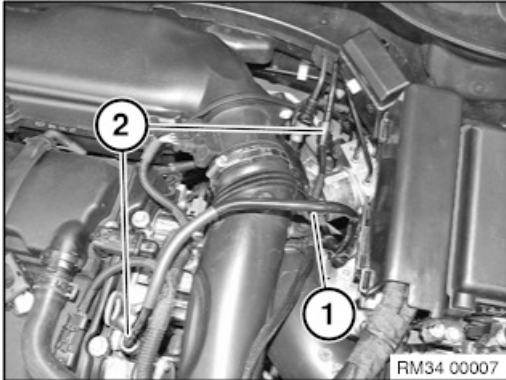
Remove line clip (1).

Detach snap fastener (2) and unfeed vacuum line with non-return valve.



**Necessary preliminary work:**

Before beginning repair work, fully press the brake pedal several times to reduce the vacuum pressure in the brake servo. This makes it easier to detach the vacuum hose.



Unclip vacuum line out of bracket (1).

Disconnect snap fasteners (2) and remove vacuum line.

Installation note:

Snap fasteners must be felt and heard snapping into place.



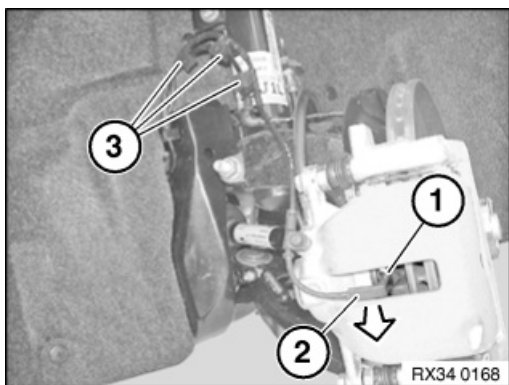
**Necessary preliminary work:**

- Remove wheel

**Important!**

The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).

If a brake pad sensor that has already been ground has to be replaced even though the minimum brake pad thickness has not yet been reached, you must observe the following: The new sliding contact must be filed down with a file to the same length as the ground sliding contact.

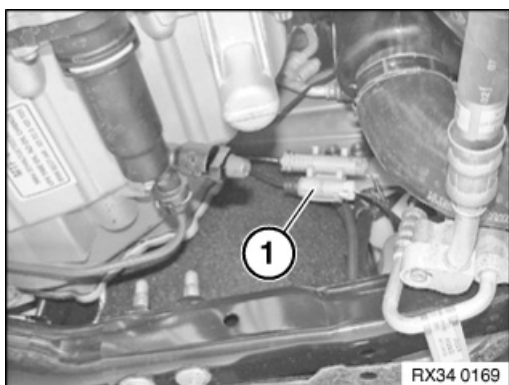


Press clamp (1) together and detach brake pad sensor (2) in direction of arrow from brake pad.

Unclip brake pad sensor (2) from holder (3).

Installation note:

Make sure clamp (1) and brake pad sensor (2) are correctly seated in brake pad.



Disconnect plug connection (1). *Installation note:*

Make sure plug connection engages correctly.



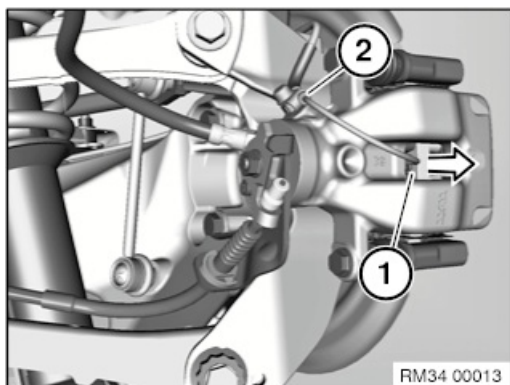
**Necessary preliminary work:**

- Remove wheel

**Important!**

The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).

If a brake pad sensor that has already been ground has to be replaced even though the minimum brake pad thickness has not yet been reached, you must observe the following: The new sliding contact must be filed down with a file to the same length as the ground sliding contact.

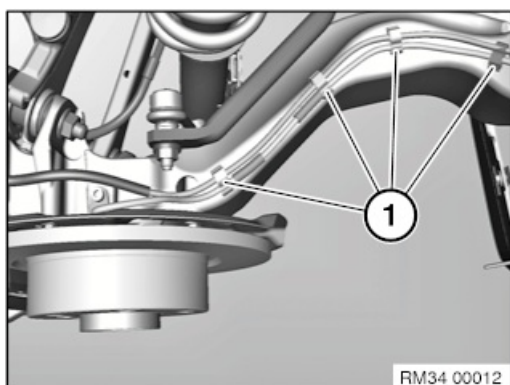


Detach brake pad sensor (1) in direction of arrow from brake pad.

Detach brake pad sensor (1) from holder (2).

Installation note:

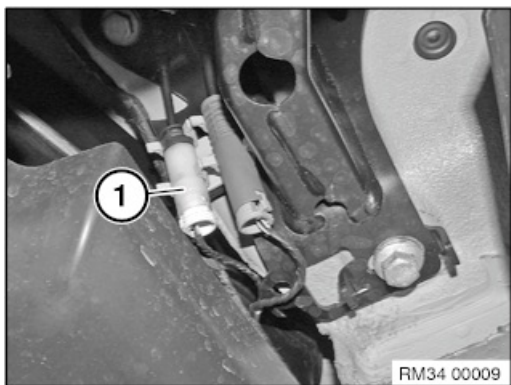
Make sure brake pad sensor (1) is correctly seated in brake pad.



Unclip cable for brake pad sensor from brackets (1). **Installation note:**

Ensure that the cable is correctly routed.





Disconnect plug connection (1). *Installation note:*
Make sure plug connection engages correctly.



34 10 014 Adjusting handbrake



Special tools required:

- 34 6 306
- 34 6 307
- 34 6 308
- 34 6 309



Perform inspection in the following manner:

When 1st ratchet is engaged, no braking force should be exerted.

The difference in wheel circumferential forces between the left and right wheels may deviate by max. 30 % from the greater value (measured on brake test stand).

In event of larger deviations of wheel circumferential force: readjust parking brake.

Braking with locked wheels must be possible with the parking brake.

The parking brake must be reset if the actuation stroke is greater than 6 teeth.



Note:

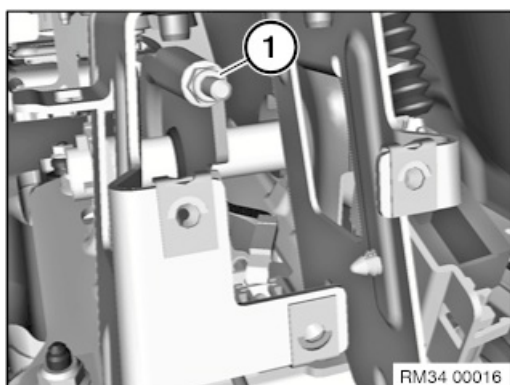
Accurate adjustment of the parking brake is only possible if the parking brake Bowden cables and all moving parts on the parking brake move easily and function correctly.

Basic setting of the parking brake is required:

- In event of excessive actuation stroke (6 teeth).
- When replacing parking brake Bowden cables
- When replacing parking brake lever

Necessary preliminary tasks:

- Remove service cap from centre console cover at rear.



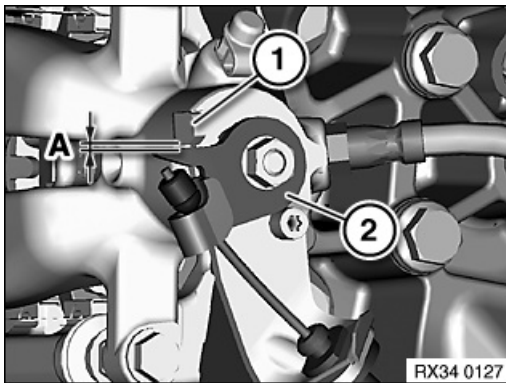
Adjusting instructions for parking brake Bowden cables

Release self-locking nut (1) until the load on the Bowden cable has been relieved completely.

Note:

Shown without centre console for the sake of clarity.





Screw in adjusting nut on parking brake lever until a gap (A) of 0.5-1.5 mm between parking brake lever (2) and stop (1) is set at brake calipers.



Important!

Observe following sequence:

1. Release adjusting nut on parking brake lever completely.
2. Adjust adjusting nut on parking brake lever as shown above.
3. Apply parking brake lever three times.
4. Press brake pedal to floor at least three times so that air gap can be set.
5. Carry out function check

Checking adjustment on brake test stand

0.Zahn

(Feststellbremse gelöst):

Vehicles with manual transmission: Shift lever in neutral position.

Vehicles with automatic transmission: Selector lever position "N" wheel circumferential force ≤ 100 N.

1.Zahn:

No brake force increase with regard to the 0th tooth. Indicator light may light up.

2.Zahn:

An increase in braking force must take place. Indicator light must be lit.

3.Zahn:

Increase in braking force.

4.Zahn:

Wheel circumferential force per wheel: 700 N to 1300 N.

(Must be achieved in the 4th tooth at the latest)



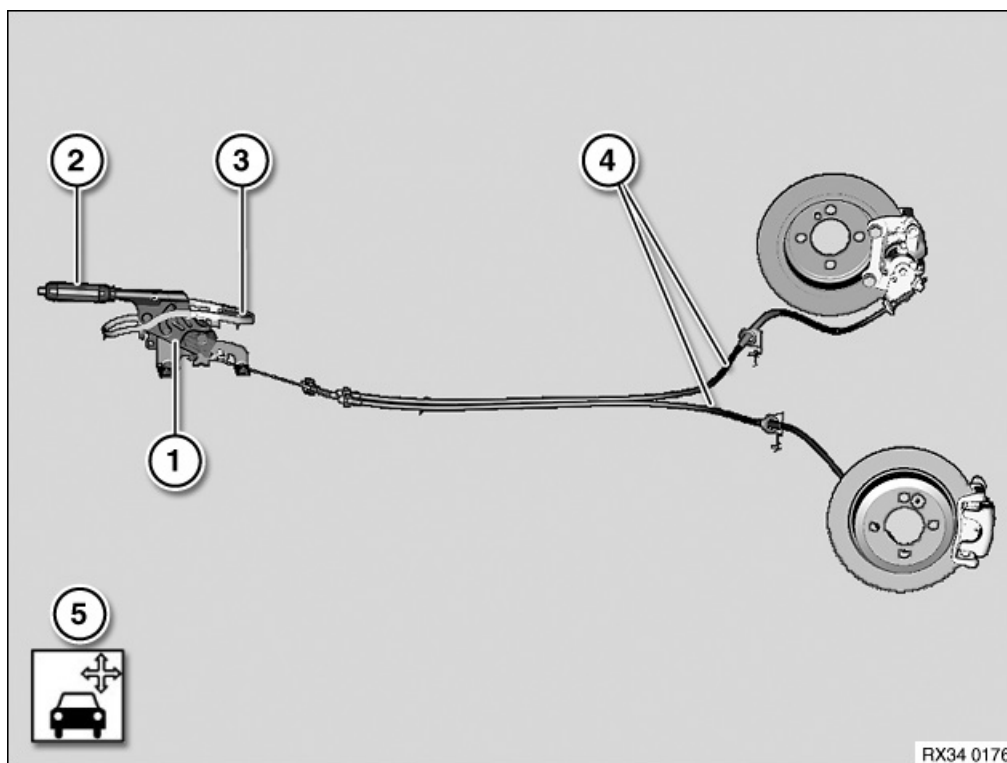
**Important!**

After completing work:

- Carry out function check on brake test stand to ensure that the brakes complies with legal requirements.
- Carry out test braking while driving at low speed; the effectiveness of the brakes may be reduced during the initial braking operations.
- Exaggerated drastic and continuous braking operations for faster braking in are not permitted.
- Advise the customer not to perform any wilful drastic braking in the first 200 km after brake replacement.
- Attach mirror tag to interior rear-view mirror.



34 41 ... Overview of parking brake



- 1 Handbrake lever
- 2 Handle for handbrake lever
- 3 Gaiter for handbrake lever
- 4 Handbrake Bowden cables
- 5 Adjusting handbrake

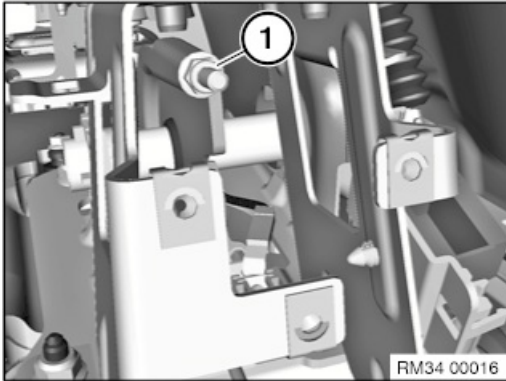




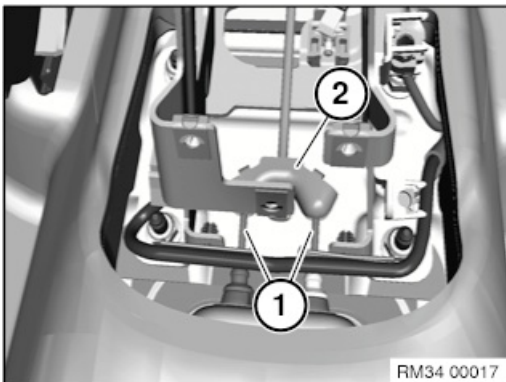
Necessary preliminary work:

- Completely remove centre console.
- Release heat shield over exhaust system and shift in position

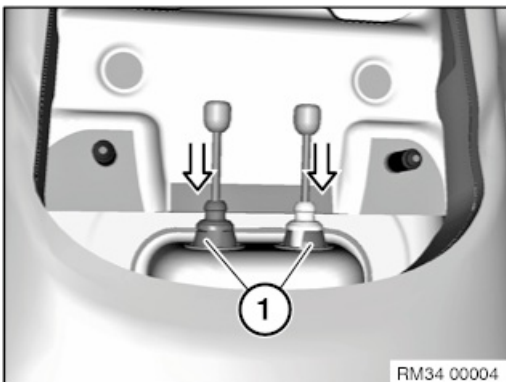
After completing repair work, adjust parking brake



Release adjusting fixture (1) for parking brake Bowden cable.



Detach both parking brake Bowden cables (1) from balance arm (2).



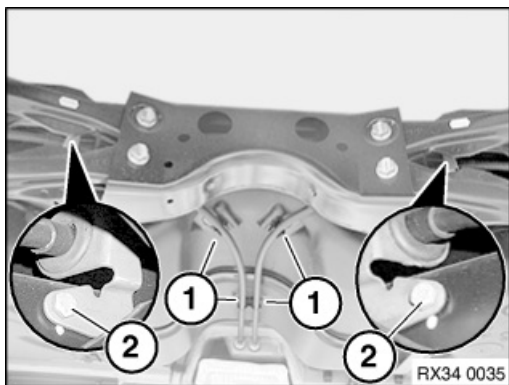
Compress circlip (1) with suitable pliers.

Push parking brake Bowden cable towards rear.

Installation note:

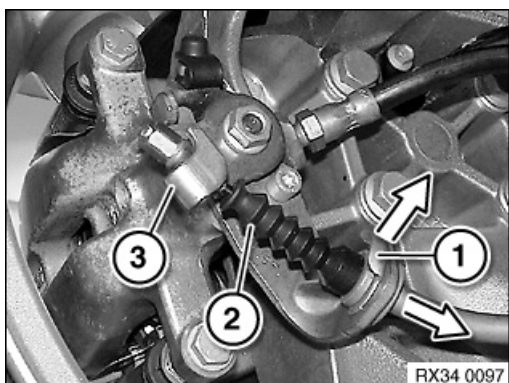
Ensure that circlips are locked correctly.





Release cables from clips (1) on fuel tank.

Release screws (2) and remove holder from wishbone at top.



Detach retaining clip (1) in direction of arrow.

Disengage parking brake Bowden cable (2) from operating lever (3) at brake caliper.

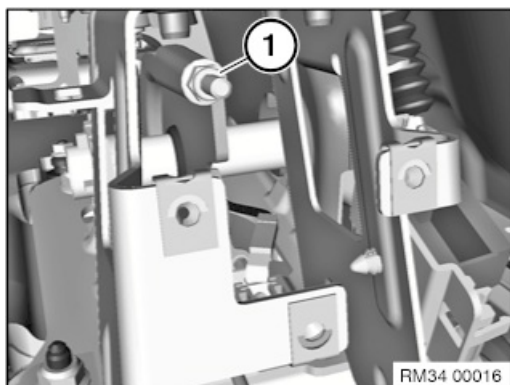
Feed out parking brake Bowden cable (2) downwards.



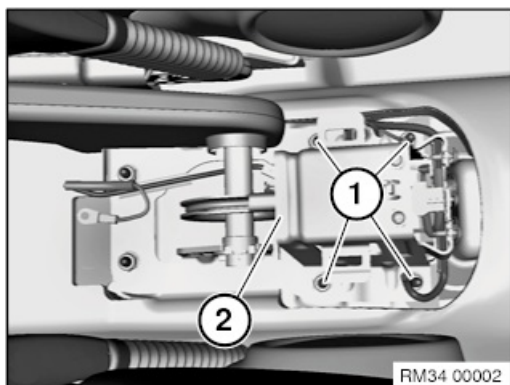
**Necessary preliminary work:**

- Fully remove centre console.

After completing repair work, adjust parking brake



Release adjuster (1) of parking brake lever.



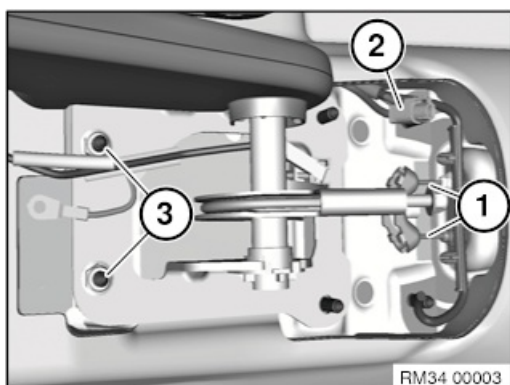
Release nuts (1) and remove holder (2).

If necessary, remove cable clip from holder (2).

Installation note:

Replace self-locking nuts.

Tightening torque 34 41 1AZ.



Detach both parking brake Bowden cables (1) from balance arm.

If necessary, remove cable clip (2).

Disconnect plug connection for handbrake light switch.

Release nuts and remove parking brake lever (1).

Installation note:

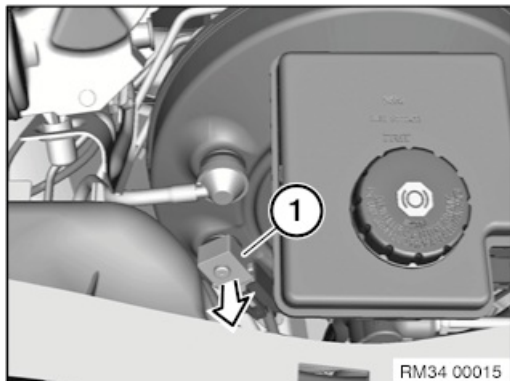
Replace self-locking nuts.

Tightening torque 34 41 1AZ.



**Necessary preliminary work:**

- Remove cowl panel cover.



Carefully remove low-pressure sensor (1) from brake servo in direction of arrow.

Disconnect plug connection at low-pressure sensor.

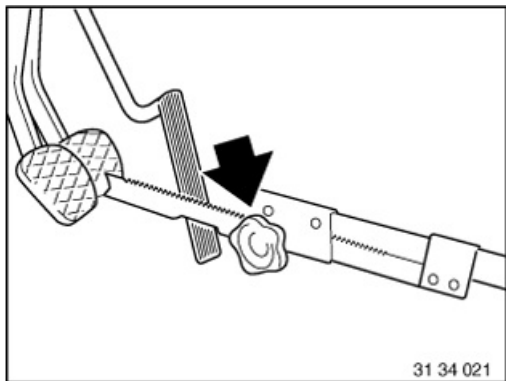




Necessary preliminary work:

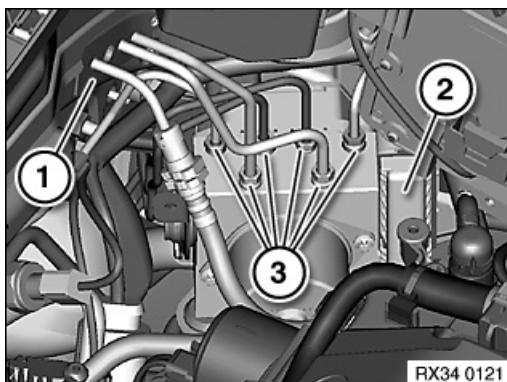
- Remove air filter.
- Vehicles with N47 engine: Remove right charge-air duct.
- Read and comply with General Information.

After completing the repair work, bleed brake system.



Press brake pedal down to floor and secure with pedal support. *Note:* The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.



Remove line holder (1) from bulkhead.

Disconnect plug connection (2).

Important!

Do not mix up brake lines and if necessary mark prior to removal.

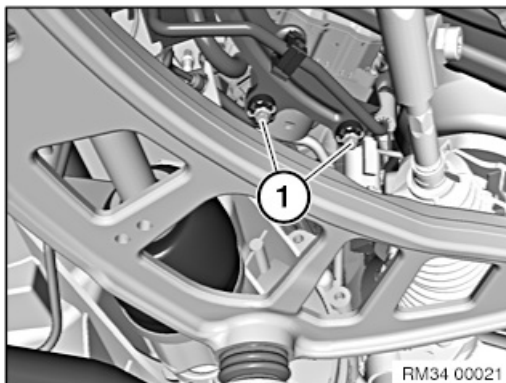
Close off connecting bores with seal plugs.

Brake lines must not be bent.

Unfasten brake lines (3).

Installation note:

Tightening torque 34 32 1AZ.



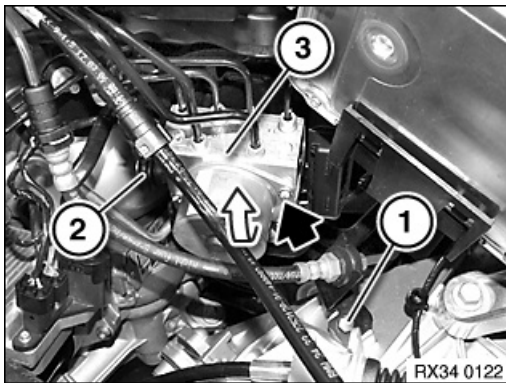
Raise vehicle.

Release screws (1) from below.

Installation note:

Tightening torque 34 51 2AZ.





Release screw (1).

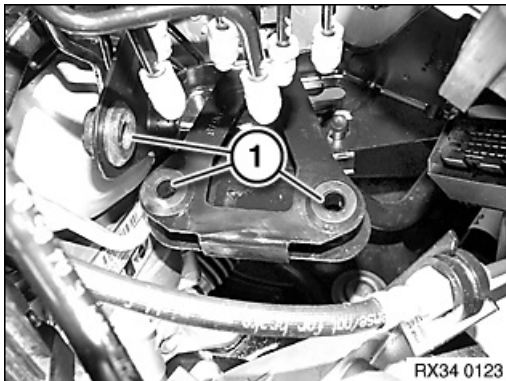
The clutch hydraulic line can be easily pressed to one side by release the holder.

Release screw (2).

Installation note:

Tightening torque 34 51 2AZ.

First raise hydraulic unit (3) a little and then swing out.



Installation note:

Make sure rubber mounts (1) are correctly fitted in bores.



Adjustment of steering angle sensor

Brake line mix-up test:

Function check, hydraulic unit

Replacement:

- Carry out programming/encoding

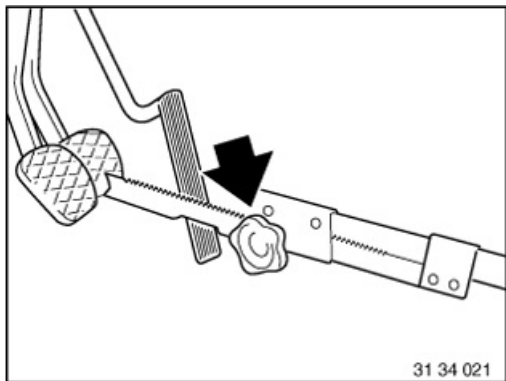




Necessary preliminary tasks:

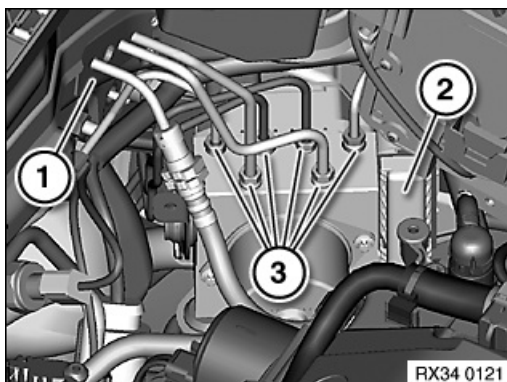
- Remove air filter.
- Vehicles with N47 engine: Remove right charge-air duct.
- Read and comply with General Information.

After completing the repair work, bleed brake system.



Press brake pedal down to floor and secure with pedal support. *Note:* The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.



Remove line holder (1) from bulkhead.

Disconnect plug connection (2).

Important!

Do not mix up brake lines and if necessary mark prior to removal.

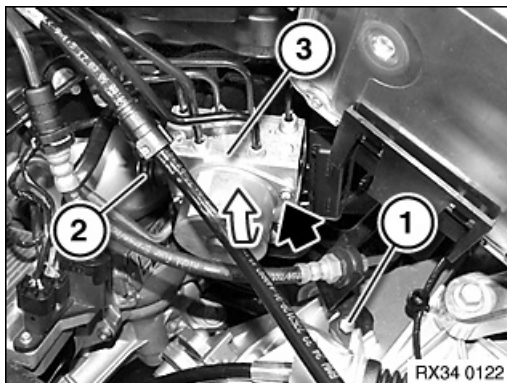
Close off connecting bores with seal plugs.

Brake lines must not be bent.

Unfasten brake lines (3).

Installation note:

Tightening torque 34 32 1AZ.



Release screw (1).

The clutch hydraulic line can be easily pressed to one side by release the holder.

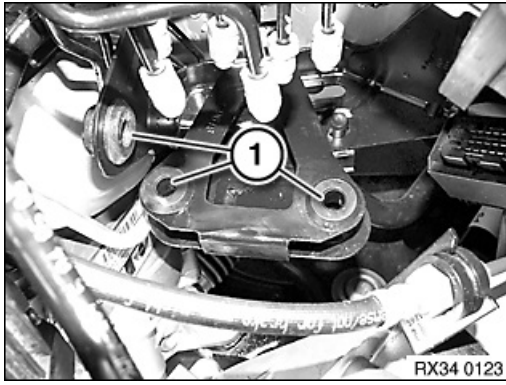
Release screw (2).

Installation note:

Tightening torque 34 51 2AZ.

First raise hydraulic unit (3) a little and then swing out.





Installation note:

Make sure rubber mounts (1) are correctly fitted in bores.



Adjustment of steering angle sensor

Brake line mix-up test:

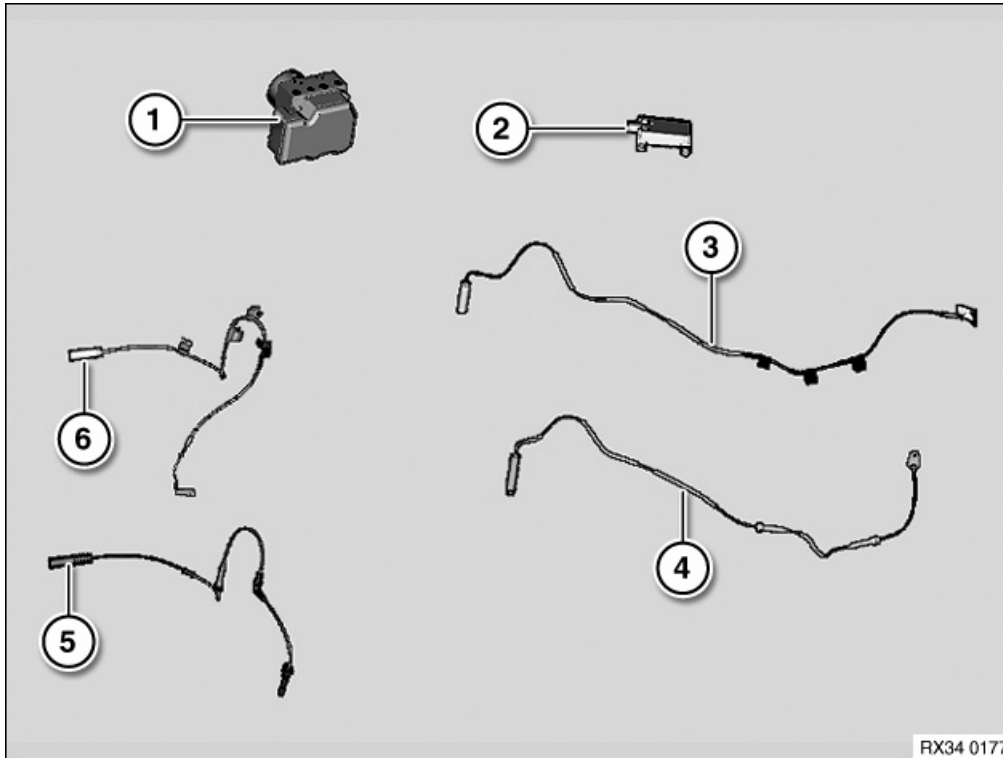
Function check, hydraulic unit

Replacement:

- Carry out programming/encoding



34 52 ... Overview of electronic components



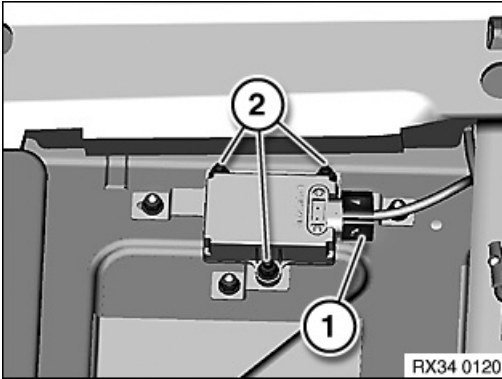
- | | |
|-------------------------|--------------------------|
| 1 DSC control unit | 2 DSC sensor |
| 3 Rear brake pad sensor | 4 Pulse sensor, rear |
| 5 Pulse sensor, front | 6 Front brake pad sensor |





Necessary preliminary work:

- Remove Combox cover.



Disconnect plug connection (1).

Important!

Vibration-sensitive component.

Implement screw connection correctly, otherwise there may be malfunctions in the DSC.

Release nuts (2) and remove DSC sensor.

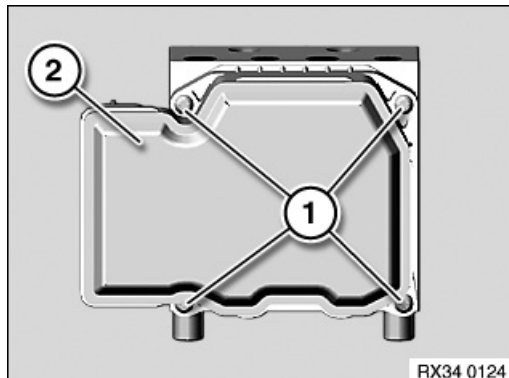
Installation note:

Tightening torque 34 51 5AZ.



**Necessary preliminary tasks:**

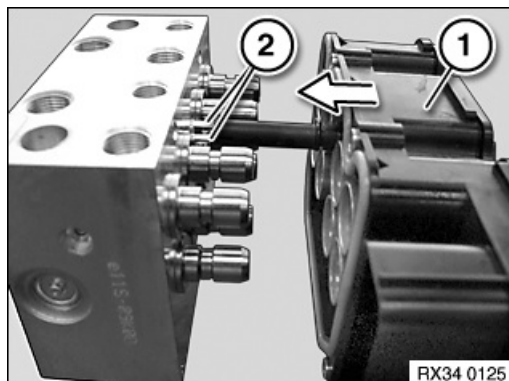
- Remove hydraulic unit



Release screws (1) and carefully remove control unit (2). **Necessary preliminary tasks:**

Tightening torque 34 51 1AZ.

Observe the following installation notes.

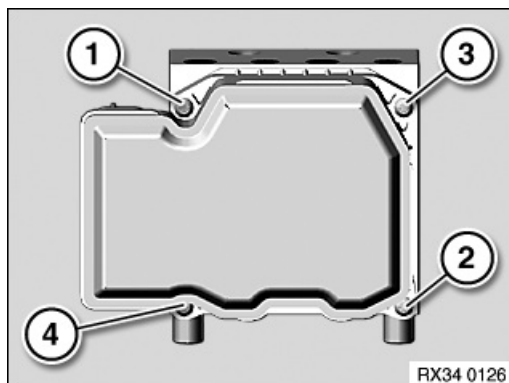
**Important!**

The control unit must not be positioned with force!

The two pins (2) must not be bent under any circumstances!

Installation note:

Carefully insert control unit (1) in direction of arrow, paying attention to the two pins (2).

*Installation note:*

Tightening sequence (1-4) must be observed.

Tightening torque 34 51 1AZ.

Replacement:

- Carry out programming/encoding
- Adjustment of steering angle sensor



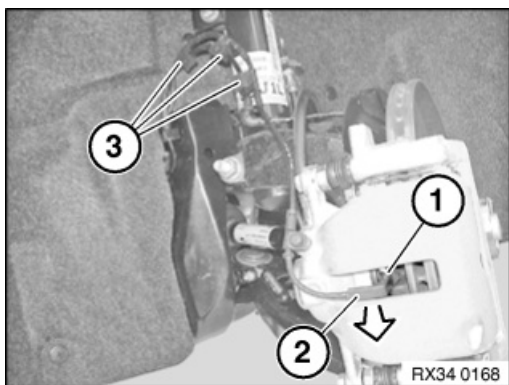
**Necessary preliminary work:**

- Remove wheel

**Important!**

The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).

If a brake pad sensor that has already been ground has to be replaced even though the minimum brake pad thickness has not yet been reached, you must observe the following: The new sliding contact must be filed down with a file to the same length as the ground sliding contact.

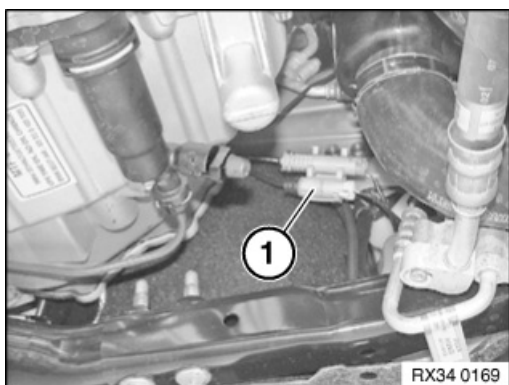


Press clamp (1) together and detach brake pad sensor (2) in direction of arrow from brake pad.

Unclip brake pad sensor (2) from holder (3).

Installation note:

Make sure clamp (1) and brake pad sensor (2) are correctly seated in brake pad.



Disconnect plug connection (1). **Installation note:**

Make sure plug connection engages correctly.



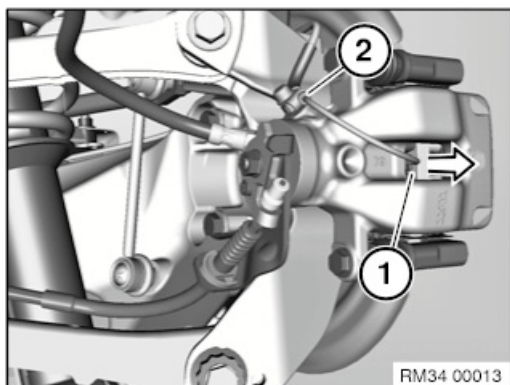
**Necessary preliminary work:**

- Remove wheel

**Important!**

The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).

If a brake pad sensor that has already been ground has to be replaced even though the minimum brake pad thickness has not yet been reached, you must observe the following: The new sliding contact must be filed down with a file to the same length as the ground sliding contact.

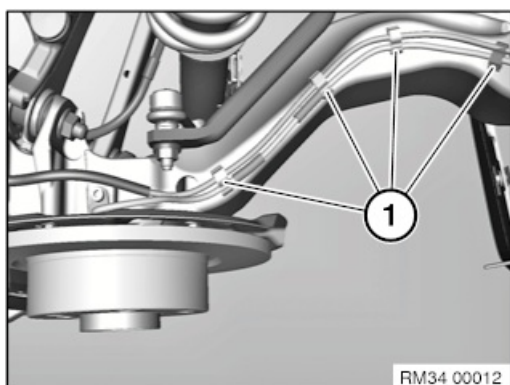


Detach brake pad sensor (1) in direction of arrow from brake pad.

Detach brake pad sensor (1) from holder (2).

Installation note:

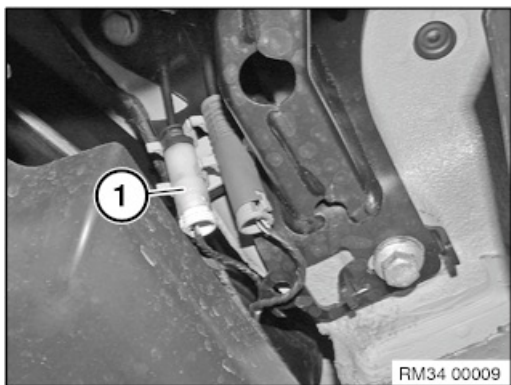
Make sure brake pad sensor (1) is correctly seated in brake pad.



Unclip cable for brake pad sensor from brackets (1). **Installation note:**

Ensure that the cable is correctly routed.



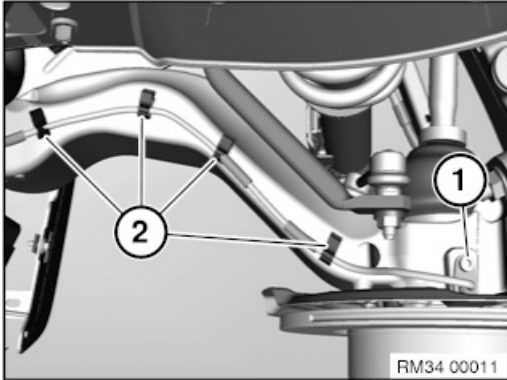


Disconnect plug connection (1). *Installation note:*
Make sure plug connection engages correctly.



**Necessary preliminary work:**

- Remove wheel.



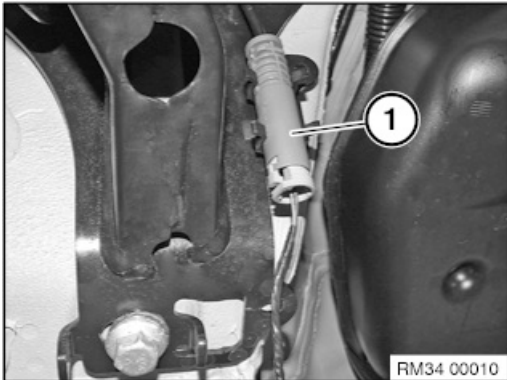
Release screw (1) and remove pulse sensor.

Unclip cable from brackets (2).

Installation note:

Tightening torque 34 51 4AZ.

Clean bore hole for pulse sensor and grease with Staburags NBU 12/K lubricating grease (refer to BMW Service Operating Fluids).



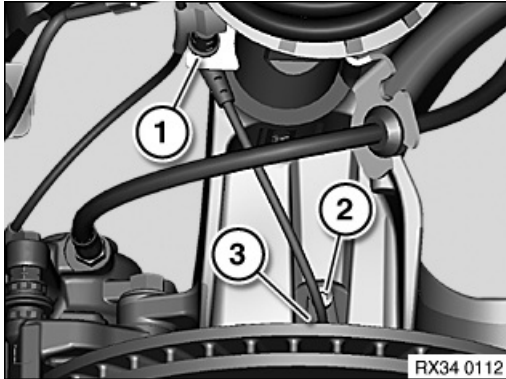
Disconnect plug connection (1). *Installation note:*

Make sure plug connection engages correctly.



**Necessary preliminary tasks:**

- Remove wheel

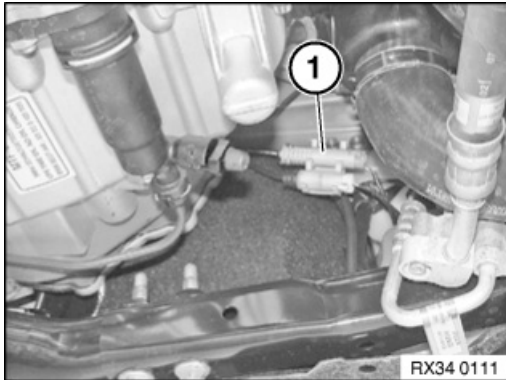


Remove cable from holder (1) on spring strut.

Release screw (2) and remove pulse generator (3).

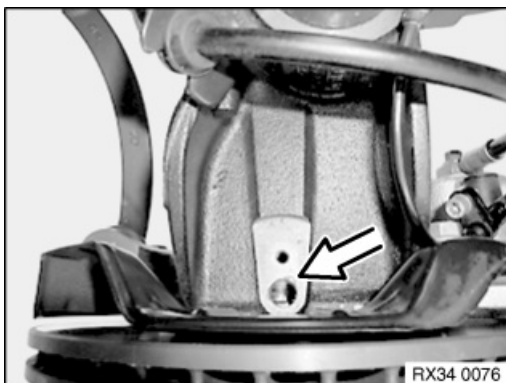
Installation:

Tightening torque 34 51 4AZ .



Disconnect plug connection (1). *Installation:*

Make sure plug connection engages correctly.



Installation:

Clean bore hole for pulse sensor and grease with Staburags NBU 12/K lubricating grease (refer to BMW Service Operating Fluids).

Important!

Check sensor head prior to installation for damage, replacing if necessary.



64 00 ... Information on using cleaning agent/paints (personal protection equipment)



Warning!

Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!

Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!



Important!

Observe following instructions:

- Store cleaning agents/paints only in a secure cabinet.
- Keep cleaning agents/paints away from naked flames and other sources of ignition.
- Protect cleaning agents/paints from high temperatures and direct sunlight.
- Always keep an eye douche on hand, change the water regularly (once a month).



Important!

Observe following instructions before use:

- Manufacturer's instructions (on container/packaging)
- Hazard warnings (on container/packaging)
- Manufacturer's instructions on package insert
- Material safety data sheet of manufacturer
- Product information in EPC
- National market regulations



Important!

Observe following instructions during use:

- Do not eat, drink or smoke while working with these products.
- Avoid direct contact with skin and eyes.
- Wear personal protective clothing/equipment.
- Ensure that all enclosed areas are well ventilated or extract fumes directly.
- Immediately change working clothes soiled with cleaning agent/paint.
- After finishing work, wash your hands and apply protective skin cream.



Important!

Follow hazard warnings and wear personal protection equipment!





First Aid:

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapours ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.



Recycling:

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.





Screw securing adhesive is a means of preventing a screwed connection from being loosened by external influences.

Once the screw has been coated with adhesive, the adhesive remains inactive until such time that it is activated by the encapsulation breaking when the screw is inserted and then cures (hardens) at room temperature.

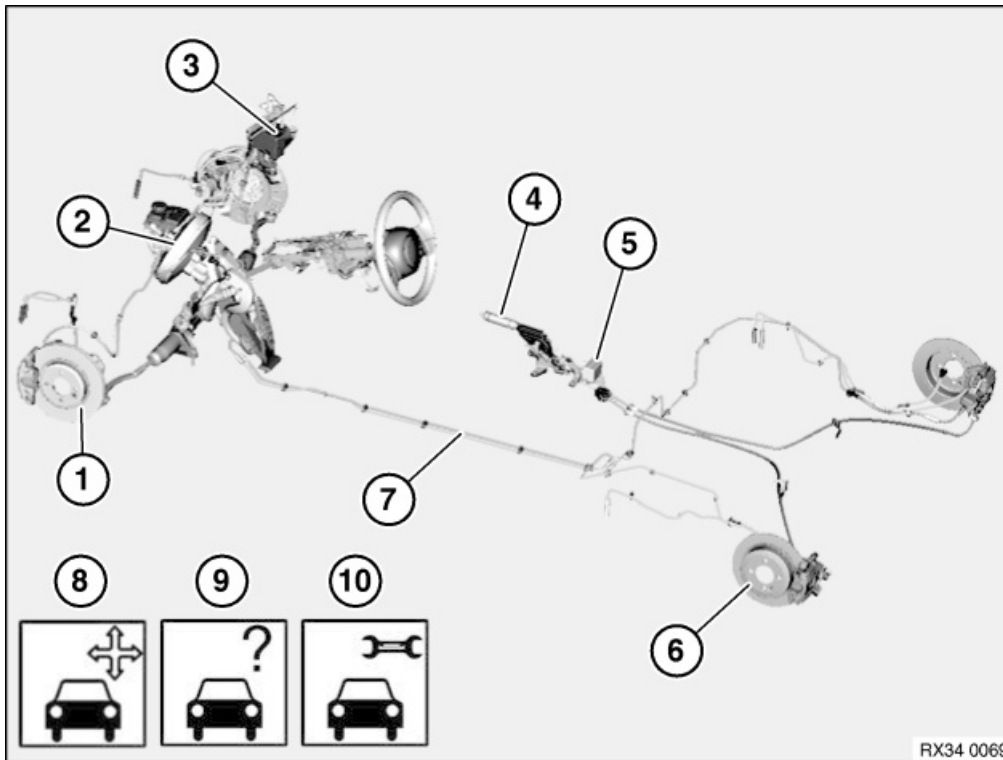


Installation note:

- Screw connection must be completed within 20 mins. (start of curing)
- Microencapsulated screws must not be retightened
- Thread of nut must be cleaned beforehand in event of repeated use



34 Overview of brakes

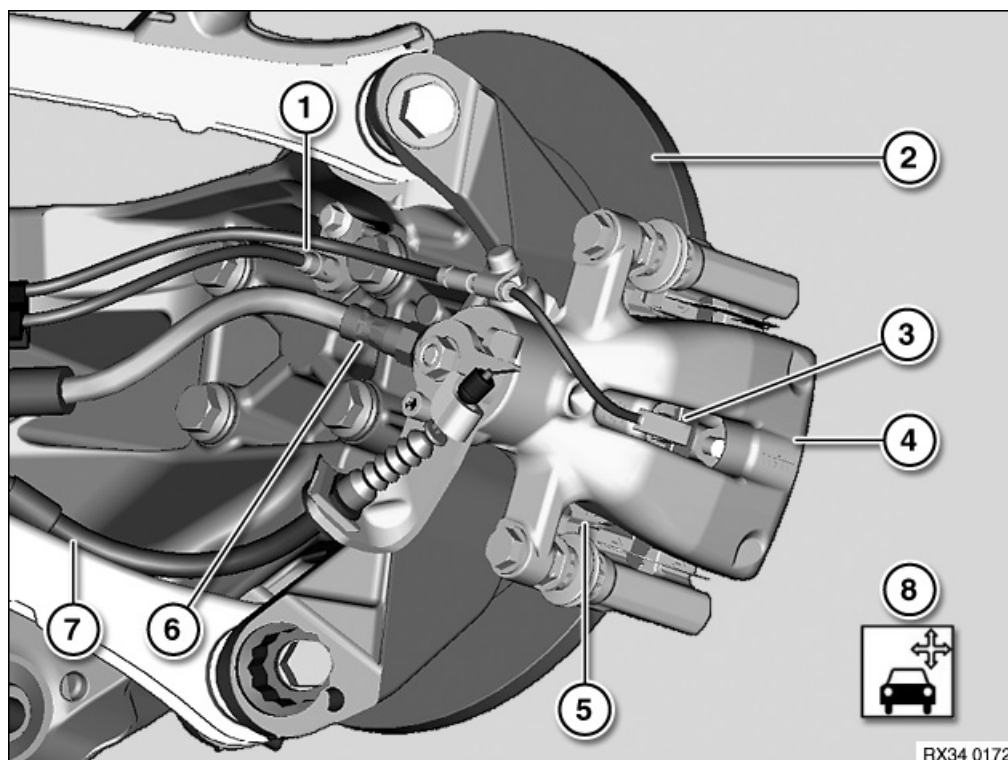


0 General Information

- | | |
|---------------------------------------|-------------------|
| 1 Front brake | 6 Rear brake |
| 2 Brake master cylinder / brake servo | 7 Brake lines |
| 3 Mechanical hydraulic components | 8 Adjustment work |
| 4 Parking brake | 9 Troubleshooting |
| 5 Electronic components | 10 Testing |



34 21 ... Overview of rear brakes

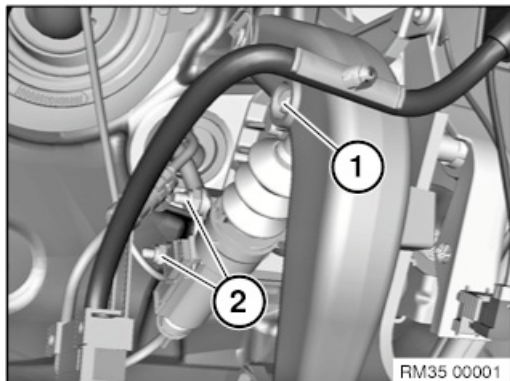


- | | |
|---------------------------|-----------------|
| 1 Pulse generator, rear | 2 Brake discs |
| 3 Brake-pad wear sensor | 4 Brake caliper |
| 5 Brake pads | 6 Brake hose |
| 7 Handbrake Bowden cables | 8 Testing |



**Necessary preliminary work:**

- Remove dashboard trim carrier at bottom left



Press pin (1) together and press out.

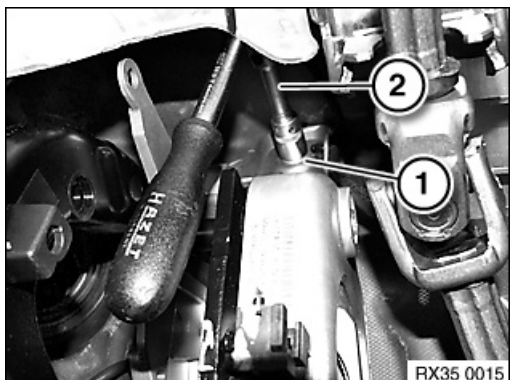
Release nuts (2) and remove clutch master cylinder.

Clutch hydraulic system remains connected!

Installation note:

Replace self-locking nuts.

Tightening torque 21 52 3 AZ.

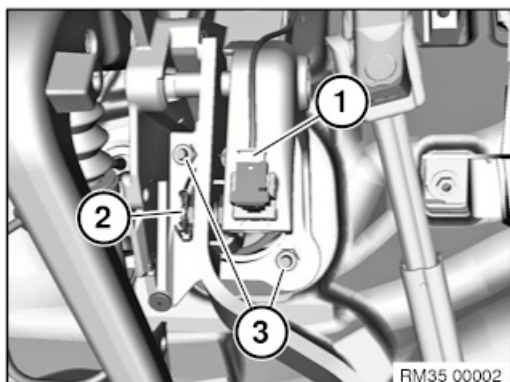


Release screw (1). *Installation note:*

Tightening torque 35 11 AZ.

Note:

Accessibility only with a 75 mm long extension (2).



Disconnect plug connection (1) on brake light switch.

Detach retaining clip (2) and press out pin in direction of arrow.

Installation note:

Check retaining clip (2) and replace if necessary.

Make sure retaining clip (2) is correctly engaged.

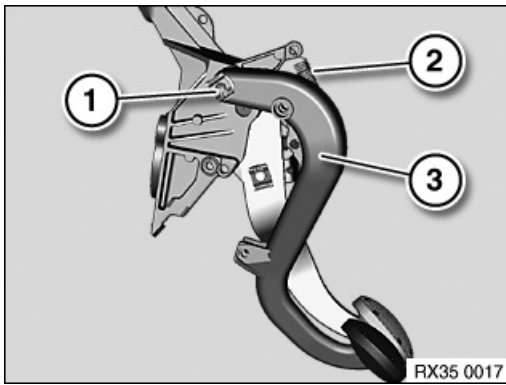
Release nuts (3) and remove complete bearing support towards bottom.

Installation note:

Replace self-locking nuts.

Tightening torque 35 11 1AZ.



**When replacing bearing support:**

Detach locking clip (1).

Installation note:

Check bearing bushes of clutch pedal and replace if necessary.

Lightly grease bearing bushes.

Check retaining clip (1) and replace if necessary.

Make sure retaining clip (1) is correctly engaged.

Disengage return spring (2) and remove clutch pedal (3).

Modify brake light switch.



*Note:*

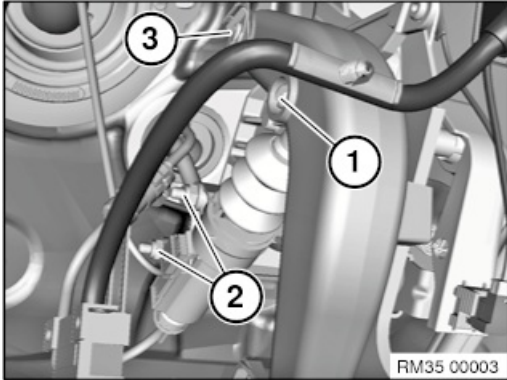
The brake pedal cannot be individually replaced.

The procedure is described in Removing and installing bearing support.



**Necessary preliminary work:**

- Remove dashboard trim carrier at bottom left



Press plastic pin (1) together and press out.

Release nuts (2) and remove clutch master cylinder.

Clutch hydraulic system remains connected!

Remove retaining clip (3) and remove clutch pedal.

Installation note:

Replace plastic pin.

Replace self-locking nuts.

Tightening torque 21 52 3AZ.

Lightly grease bearing bushes.

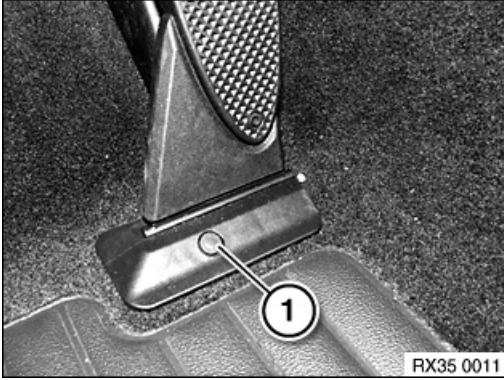
Check bearing bushes of clutch pedal and replace if necessary.

Make sure retaining clip (3) is correctly engaged.

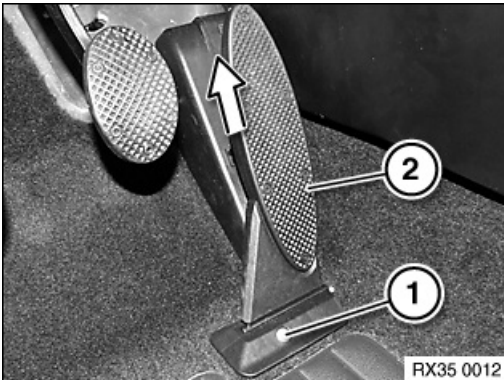
Check retaining clip (3) and replace if necessary.



35 40 001 Removing and installing or replacing accelerator pedal module



Take off cover (1).

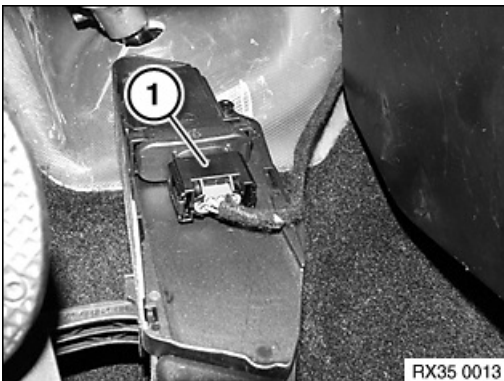


Release socket head cap screw (1).

Installation note:

Tightening torque 35 40 1AZ.

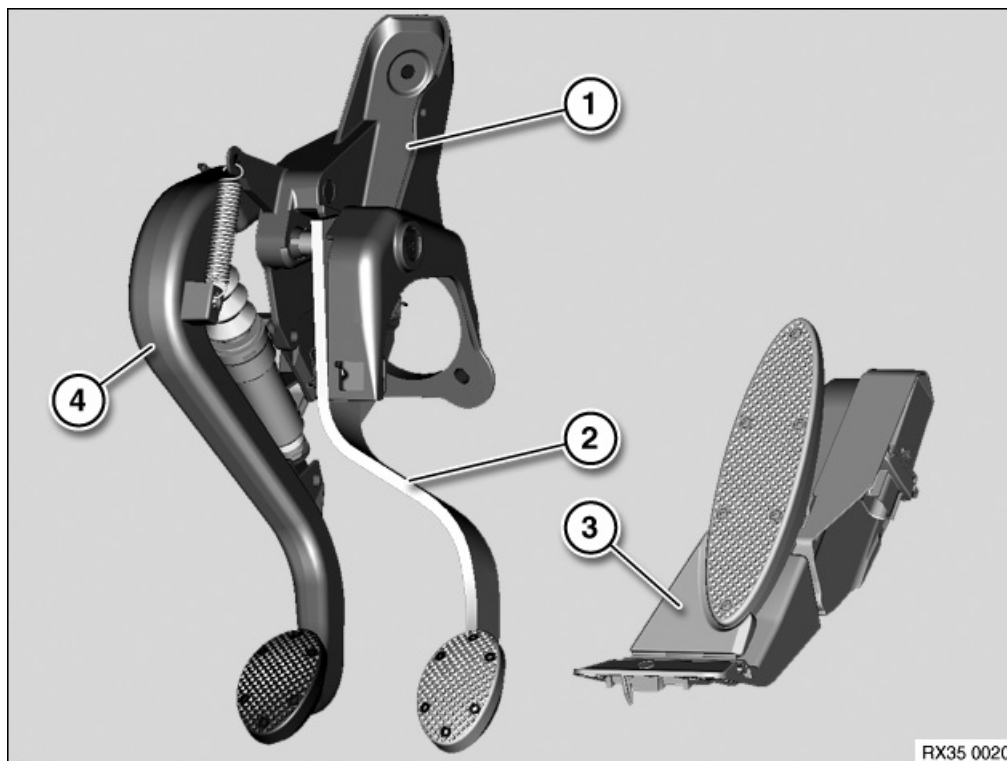
Feed out accelerator pedal module (2) towards top.



Disconnect plug connection (1) and remove accelerator pedal module.



35 Overview of pedals



- 1 Mounting block 3 Accelerator pedal module
- 2 Brake pedal 4 Clutch pedal



36 10 713 Checking one road wheel on balancing machine for face and radial runout (wheel removed)



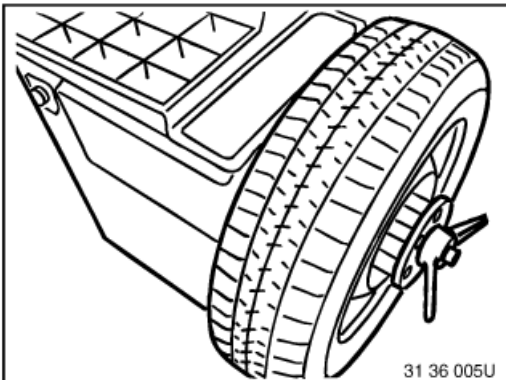
Special tools required:

- 36 1 030
- 36 1 031
- 36 1 032
- 36 1 033
- 36 1 034
- 36 1 035
- 36 1 036



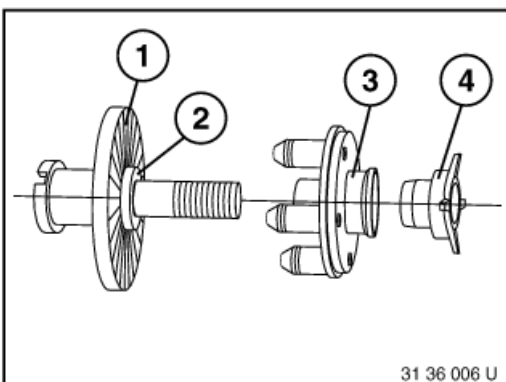
Necessary preliminary tasks:

- Remove wheel.



Mount wheel in balancing machine.

To avoid retooling errors, fit the wheel on the balancing machine in the same way as it is also fitted on the car (valve position facing down).

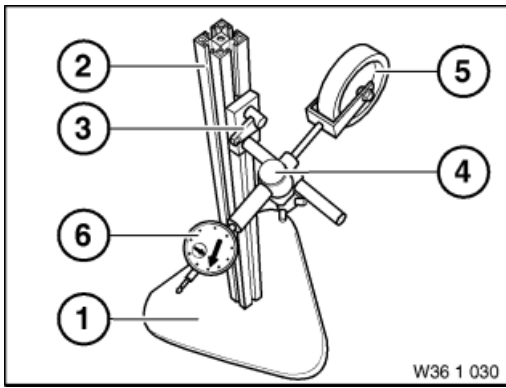


Use suitable wheel centring element supplied with corresponding balancing machine.

1. Basic flange
2. Wheel centring element
3. Type flange
4. Clamping nut

Also refer to section on Workshop Equipment.

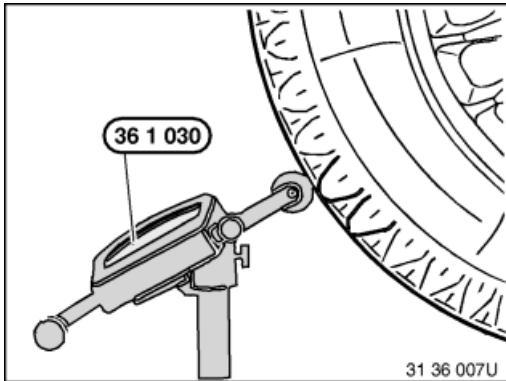




Use special tool 36 1 030 for testing.

Special tool 36 1 030 consists of:

- (1) Stand 36 1 031
- (2) Post with clamp 36 1 032
- (3) Holder with clamp 36 1 033
- (4) Clamp 36 1 034
- (5) Measuring roller 36 1 035
- (6) Dial gauge 36 1 036

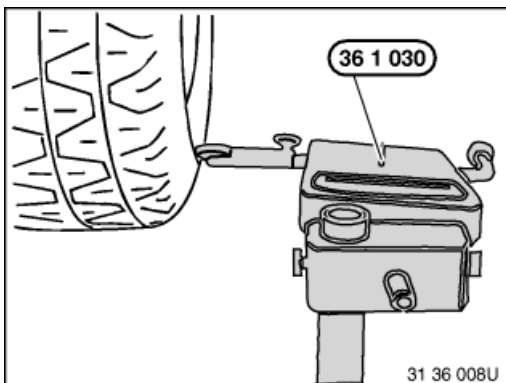


Position special tool 36 1 030 on tyre tread.

Turn wheel by hand and measure max. radial tyre runout.

Note:

Measuring device must be vertical to tyre tread.



Position special tool 36 1 030 on tyre side wall.

Turn wheel by hand and measure max. lateral tyre runout.

Note:

Measuring device must be vertical to tyre side wall.

Never measure on printed text on tyre!

If necessary, check disc wheel (rim) for radial and face runout.

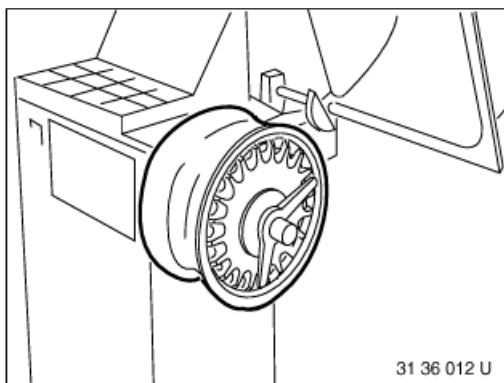


**Necessary preliminary tasks:**

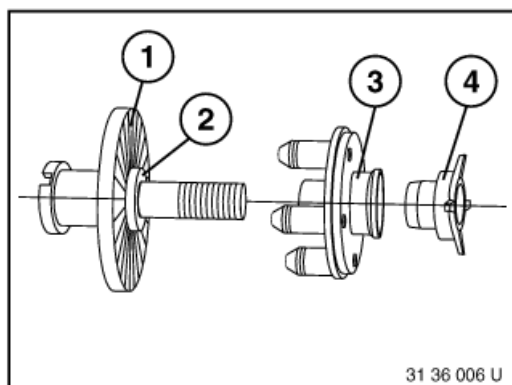
- Remove wheel
- Checking front and rear wheel for face and radial runout
- Pull tyre off rim
- Remove fitted balance weights
- Remove dirt from rim well and rim flange

**Important!**

Disc wheels must not be repaired!



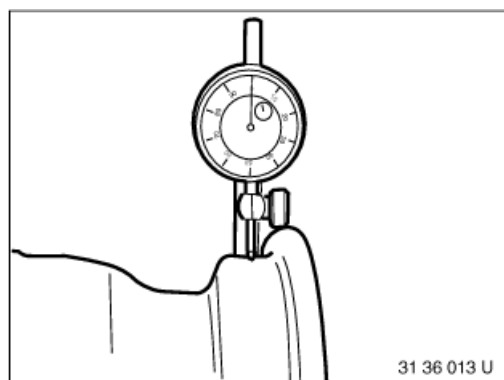
Mount disc wheel in balancing machine.



Use suitable wheel centring element supplied with corresponding balancing machine.

1. Basic flange
2. Wheel centring element
3. Type flange
4. Clamping nut

Also refer to section on Workshop Equipment.



Place dial gauge sensor on rim shoulder.

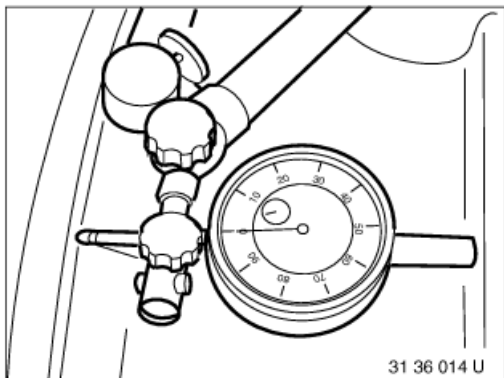
Turn wheel by hand and measure max. radial runout.

Carry out measurement on both rim shoulder sides.

Note:

Dial gauge must be vertical to rim shoulder.





Position sensor on rim flange.

Turn wheel by hand and measure max. lateral runout.

Carry out measurement on both rim flanges.

Note:

Dial gauge must be vertical to rim flange.



Important!

Avoid transformation errors during subsequent installation tasks.



36 12 ... Notes and specifications for tyre / wheel exchange

General:

- The tyre size, manufacturer and tyre tread must be the same on one axle
- To meet the BMW standards, the vehicle should be equipped with tyres from the same manufacturer and with the same tyre tread (tyres approved by BMW) on all 4 wheels
- The difference in tyre tread depth on one axle must not exceed 2 mm (control quality of suspension control systems and wheel alignment requirement)
- The tyres with the higher tread depths must be mounted on the rear axle
- The DOT age difference must not exceed 4 years
- The tyre pressure must be adjusted when the tyres are exchanged

Wheel exchange between the axles

The wheels may be exchanged between axles to achieve even abrasion. However, BMW does **not recommend** switching the front wheels to the rear or vice-versa.

The wheel exchange may lead to the following customer complaints:

- complaints regarding acoustics
- Risk of increased lane groove sensitivity

Compliance with the following requirements is required when exchanging wheels between the axles:

- Assess the wear pattern
- The tread difference between the front and rear wheels must not exceed a maximum of 2-3 mm
- Exchange the wheels between the axles every **5000 Km**

Additionally for all-wheel drive vehicles:

- The tyre size, manufacturer and tyre tread must be identical on all wheels; different tyre sizes between front and rear axles are only permissible if mixed tyres are fitted.
- The tyre tread difference between tyres in all wheel positions must not exceed **2 mm** (normal quality of the wheel control systems and wheel alignment requirement)



**Special tools required:**

- 36 2 020
- 81 25 2 344 011

**Important!**

Wheel was balanced electronically.

When fitting all four wheels (e.g. when changing from summer to winter wheels), check the tyre inflation pressure.

To avoid tyre damage, advise the customer to check the tyre pressures on a regular basis (see operating instructions).

Follow instructions on initialisation of the Run Flat Indicator (RPA).



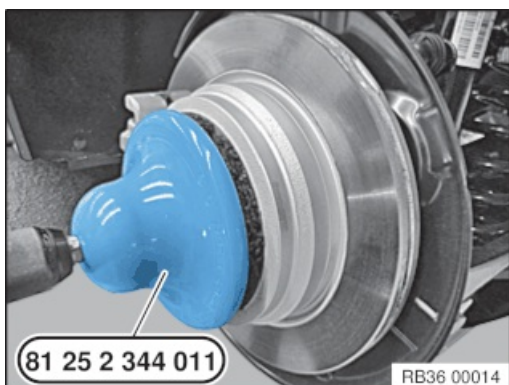
Observe the following procedure to prevent clamping error and imbalance:

- Loosen wheel studs.
- The wheel is positioned such that the valve is at the bottom.
- If several wheels are removed simultaneously, mark with a piece of chalk on each tyre the axle and side on which the corresponding wheel is fitted.
- Mark alignment of wheel with respect to wheel hub.
- Mark position of lockable wheel stud.
- Release wheel studs and remove wheel.

**Important!**

Contact surfaces between:

- brake disc and disc wheel
- Brake disc and wheel hub must be clean and free from oil and grease.



Remove dirt, grease residues and corrosion from contact surface with a drill and special tool 81 25 2 344 011. **Important!**

Do not operate special tool 81 25 2 344 011 with an impact screwdriver!

Note:

Degrease contact surface with universal cleaner, refer to BMW Parts Department.

The brake disc must be removed and cleaned if grease residue is found in the area of the bore holes for the wheel stud holes.



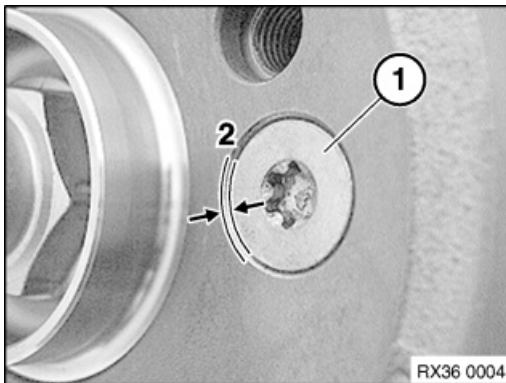


Remove dirt, grease residues and corrosion from contact surface with a drill and special tool 81 25 2 344 011. **Important!**

Do not operate special tool 81 25 2 344 011 with an impact screwdriver!

Note:

Degrease contact surface with universal cleaner, refer to BMW Parts Department.



Check firm fit of brake disc retaining screw (1). **Important!**

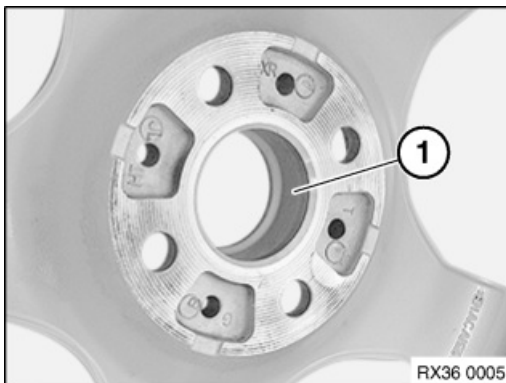
On no account must the mounting bolt(1) protrude over contact surface (2) between brake disc and disc wheel.

Front axle:

Tightening torque 34 11 1AZ.

Rear axle:

Tightening torque 34 21 1AZ.



Apply a thin coat of grease to wheel centring (1) in disc wheel.

Refer to BMW Operating Fluids, Main Group 36.



Note:

User matching adapter from tool set 36 2 020 (wheel stud adapter set) to release and tighten down the wheel stud with security code.



**Important!**

Under no circumstances use pneumatic or electric screwdrivers to install and tighten the wheel studs.

Do not apply oil to new wheel studs.

Installation note:

Clean wheel studs and check threads for damage, replace, if necessary.

Replace rusty wheel studs.

**Important!**

Wheel rim must rest uniformly against the brake disc.

In the case of non-original BMW wheel studs/rims it may be necessary to retighten the wheel studs on account of setting properties (refer to manufacturer's documents).

Tightening specifications:

1. Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim.
2. Tighten down wheel studs in crosswise sequence with a calibrated torque wrench to prescribed tightening torque 36 10 1AZ.
3. Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.

**Important!**

Changed wheel studs with a diameter of M14 and 17 WAF!

Observe change tightening torque 36 10 1AZ.



**Special tools required:**

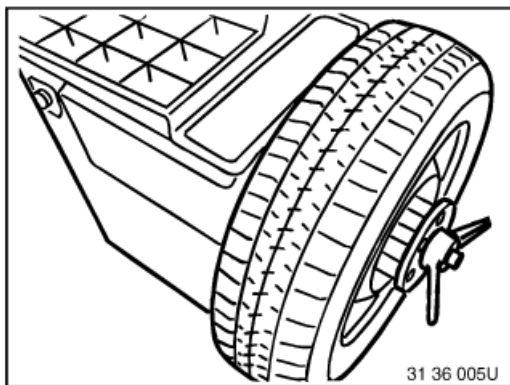
- 36 1 010
- 36 1 020

**Necessary preliminary tasks:**

- Remove wheel

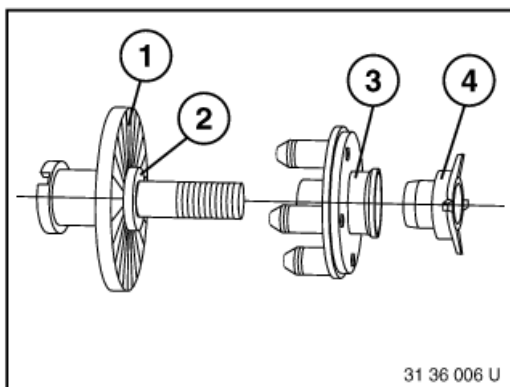
**Important!**

Use only BMW-approved balance weights.



Remove any fitted balancing weights, stones in tread pattern and larger contaminants.

Check tyre pressure, check tyre for condition, damage, flat spots (out-of-round caused by e.g. stopping the car with hot tyres); if necessary, check wheel and tyre for radial and lateral runout.



Use BMW-approved centring elements of relevant balancing machine manufacturers.

1. Basic flange
2. Wheel centring element
3. Type flange
4. Clamping nut

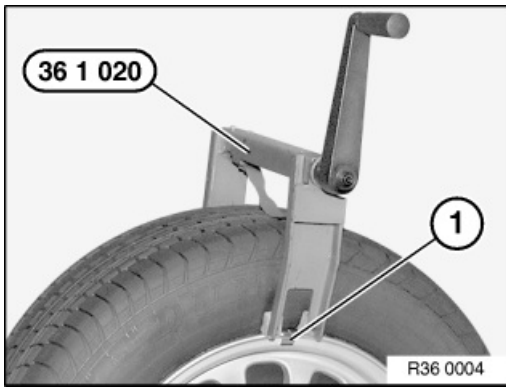
Also refer to section on Workshop Equipment.

**Important!**

To avoid retooling errors, it will be necessary to fit the wheel on the balancing machine in the same way (e.g. valve facing down) as it is then fitted on the car.

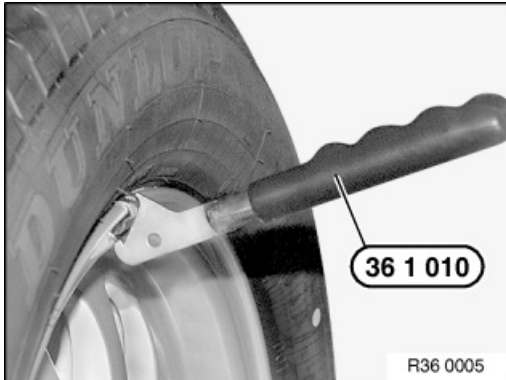
Balance wheel in accordance with operating instructions of relevant balancing machine.



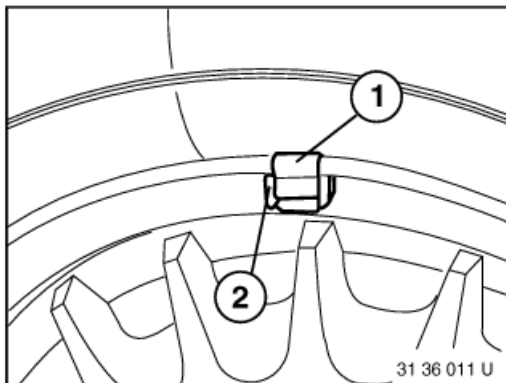


On light-alloy rims with distinctive J-shape rim flange, proceed as follows:

1. Gently force off tyre side wall with special tool 36 1 020 at appropriate point from rim flange.
2. Install retaining clip (1).
3. Remove special tool 36 1 020 .



Raise retaining clip with special tool 36 1 010 . Slide balance weight underneath and allow it to snap into place.



Arrangement of balance weights for light-alloy rims with distinctive J-shape rim flanges.

1. Spring retainer
2. Balance weight

Adhesive weights must be used on all other light-alloy rims.

Max. imbalance per wheel.



Note:

When using adhesive weights, proceed as follows:

1. Carefully remove any adhesive weights. Do not damage rim when doing so.
2. Select suitable location for fitting.
3. Clean adhesive area thoroughly.

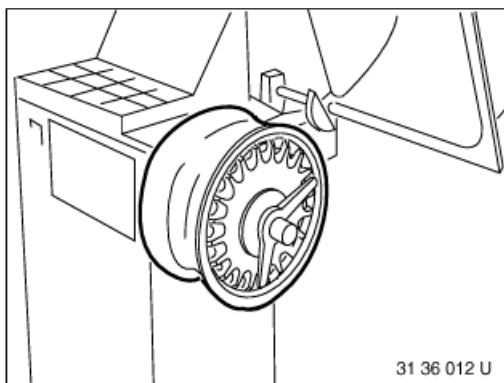


**Necessary preliminary tasks:**

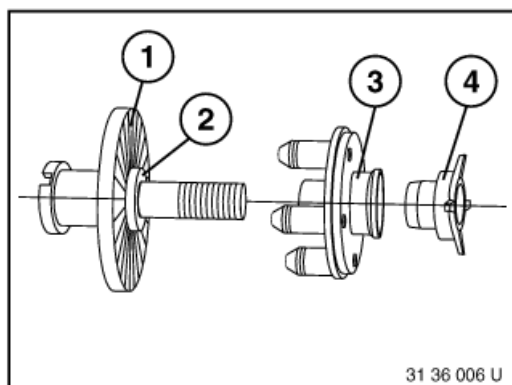
- Remove wheel
- Checking front and rear wheel for face and radial runout
- Pull tyre off rim
- Remove fitted balance weights
- Remove dirt from rim well and rim flange

**Important!**

Disc wheels must not be repaired!



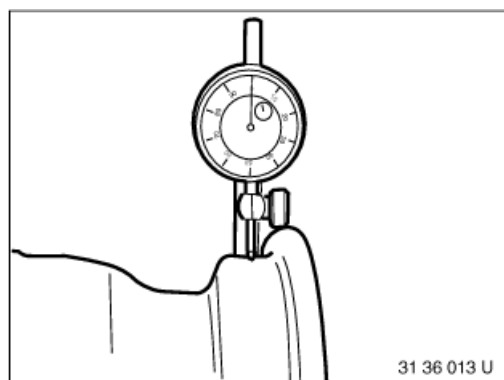
Mount disc wheel in balancing machine.



Use suitable wheel centring element supplied with corresponding balancing machine.

1. Basic flange
2. Wheel centring element
3. Type flange
4. Clamping nut

Also refer to section on Workshop Equipment.



Place dial gauge sensor on rim shoulder.

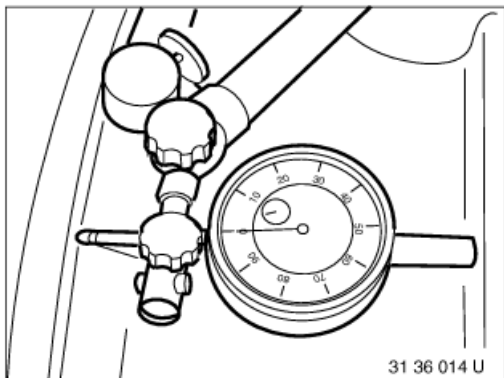
Turn wheel by hand and measure max. radial runout.

Carry out measurement on both rim shoulder sides.

Note:

Dial gauge must be vertical to rim shoulder.





Position sensor on rim flange.

Turn wheel by hand and measure max. lateral runout.

Carry out measurement on both rim flanges.

Note:

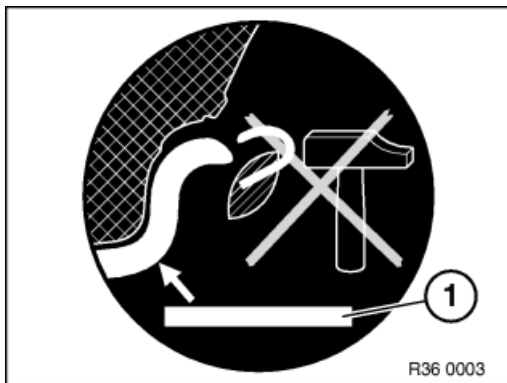
Dial gauge must be vertical to rim flange.



Important!

Avoid transformation errors during subsequent installation tasks.





Note:

It is sometimes difficult to distinguish light alloy disc wheels visually from steel disc wheels.

Identifying features:

- Label on light alloy disc wheel. (1) = Indication "Aluminium"
- Wall thickness of rim dish: approx. 8 mm.
- Light alloy disc wheels are not magnetic.
- Light alloy disc wheels can be identified from their BMW parts numbers, refer to BMW Parts Service.

Important!

- Use only BMW-approved two-part balancing weights.
- When fitting two-part balancing weights, always use specified tools.
- Do not straighten light alloy disc wheels: always replace damaged light alloy disc wheels.
- Notches in light alloy disc wheels can lead to cracking.
- Do not lubricate wheel studs.
- When fitting tyres, avoid damaging light alloy disc wheels, e.g. on sharp-edged retaining claws on fitting machine.



**Note:**

Checking the tyre pressure is based on monitoring the speeds of the wheels in relation to each other. A tyre puncture is detected and signalled by way of a deviation in specific speed ratios.

The four tyres mounted on the vehicle are monitored while the vehicle is moving.

Initialization must be carried out immediately after correction of the tyre pressure or changing/replacement of a tyre.

Important!

The tyre defect indicator does not function when the car is driven with the compact spare wheel.

Please refer to the relevant Owner's Handbook for details of the initialization procedure.



*Note:*

RDC monitors the tyre inflation pressure in the four wheels.

Each tyre incorporates an electronic wheel circuit, which constantly monitors the tyre inflation pressure.

The system signals when the inflation pressure drops in one or more tyres.

Resetting must be carried out in each case immediately after tyre pressures have been corrected, after tyres/wheels have been replaced and after repairs to the air spring system.

Please refer to the relevant Owner's Handbook for details of the resetting procedure.



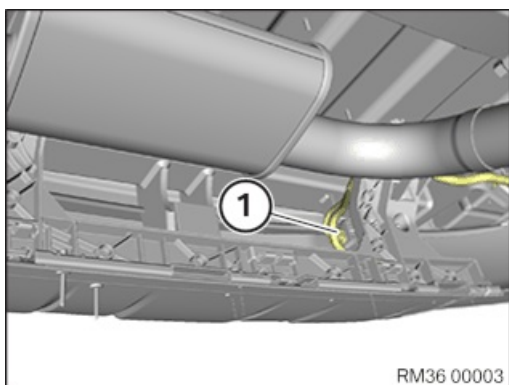


Necessary preliminary tasks:

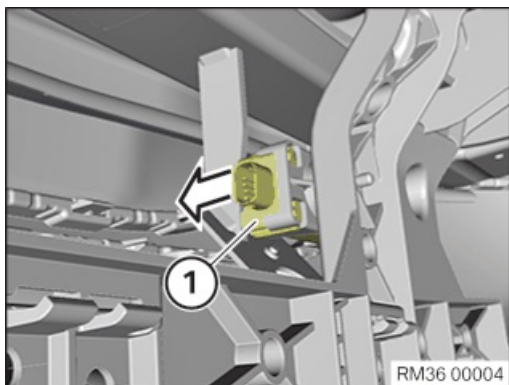
- Raise vehicle.



Removal:



Disconnect plug connection (1).

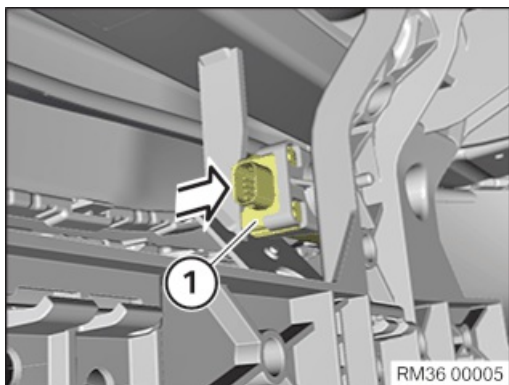


Press the retaining tabs apart and remove the RDC control unit in direction of arrow.

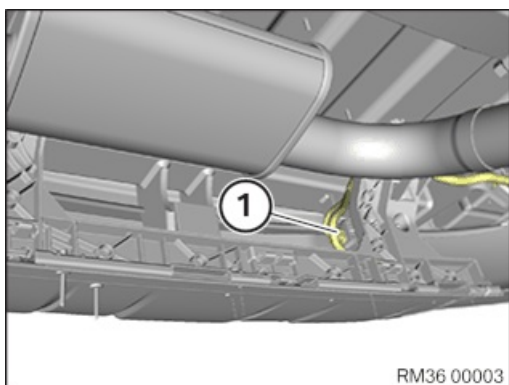


Installation:





Install the RDC control unit in direction of arrow.



Connect plug connection (1).



Required follow-up work:

- Carry out programming/encoding



36 11 533 Removing and installing/replacing RDC wheel electronics (2nd generation/3rd generation)



Attention!

Before removing or refitting, check which generation of wheel electronics is fitted! (See BMW Electronic Parts Catalogue)

If the wheel electronics have been removed, the complete valve must be replaced.

Note:

There are two different wheel electronics. Generation 2 wheel electronics must be used with RDC-01 and RDC-02 from model year 03/06.

Generation 3 wheel electronics must be used with the RDC-LC from model year 09/09 (all R5x/R6x vehicles).

If a tyre sealant has been used, replace the wheel electronics.

When a tyre has been removed, do not clean the rim with installed wheel electronics with high-pressure cleaning equipment.

Before the installation of new wheel electronics with valve, thoroughly clean the valve bore of the wheel rim.

Do not treat wheel electronics with solvents, cleaning agents etc. If dirt contamination, wipe with a clean cloth only.

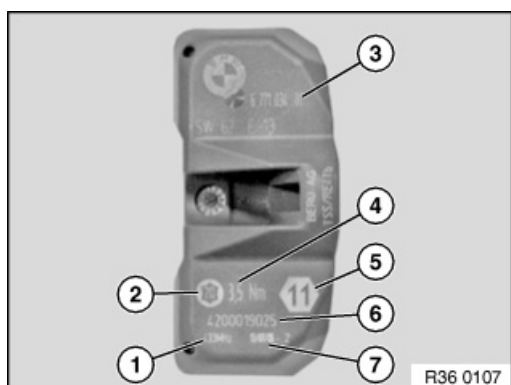
Do not clean wheel electronics with compressed air.

When tyre sealant is used, the installed wheel electronics must necessarily be replaced.



Necessary preliminary tasks:

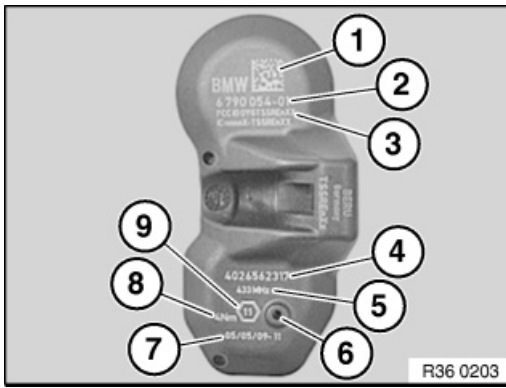
- Remove tyre



Labelling of generation 2.3 wheel electronics

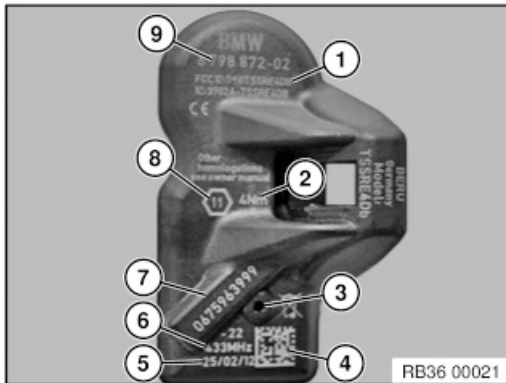
- 1 Transmission frequency of wheel electronics
- 2 Large Torx socket screw
- 3 BMW part number
- 4 Tightening torque of Torx screw and union nut
- 5 Width across flats of union nut
- 6 Serial number of wheel electronics
- 7 Production date of wheel electronics





Labelling of generation 2.4 and 3.3 wheel electronics

1. Data Matrixcode
2. BMW part number
3. FCC ID = radio authorisation
4. Wheel electronics ID
5. Transmission frequency
6. Pressure sensor
7. Production date of wheel electronics
8. Tightening torque
9. Width across flats of union nut



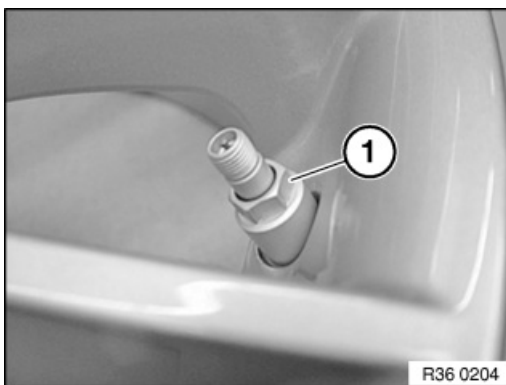
Labelling of generation 3.4/3.41 wheel electronics

1. FCC ID = radio authorisation
2. Tightening torque
3. Pressure sensor
4. Data Matrixcode
5. Production date of wheel electronics
6. Transmission frequency
7. Wheel electronics ID
8. Width across flats of union nut
9. BMW part number



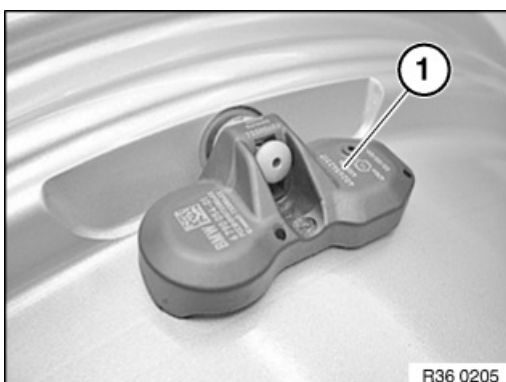
Note:

The following images show the removal and installation of generation 3 wheel electronics only. The instructions also apply without alteration to the 2nd generation wheel electronics.



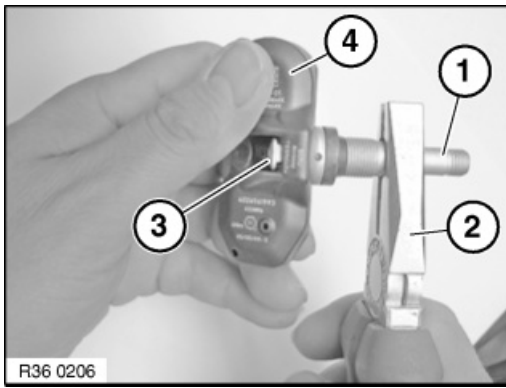
Removing wheel electronics

Release union nut (1).



Remove wheel electronics and valve (1) from valve hole.





Using suitable pliers (2), unscrew valve (1) from the thread of the square-head bolt (3), while holding the wheel electronics module (4) firm. Completely unscrew valve (1).

Remove square-head bolt from wheel electronics holder.

Installation note:

The valve must be renewed!

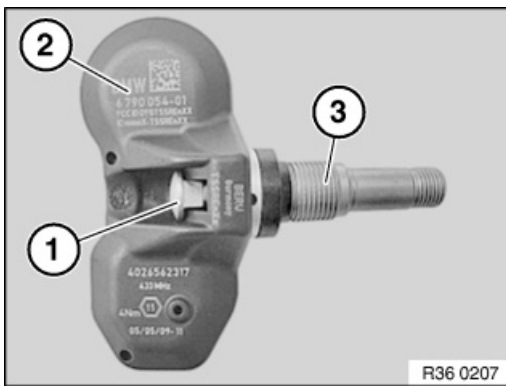
Failure to replace the part leads to leaks!



Attention!

Before the installation of new wheel electronics with valve, thoroughly clean the valve bore of the wheel rim!

Also make sure that the valve bore has been deburred.



Installing wheel electronics

Insert new square-head bolt (1) in wheel electronics module (2).

Screw single-use valve insert (3) three turns onto square-head bolt (1).

Note:

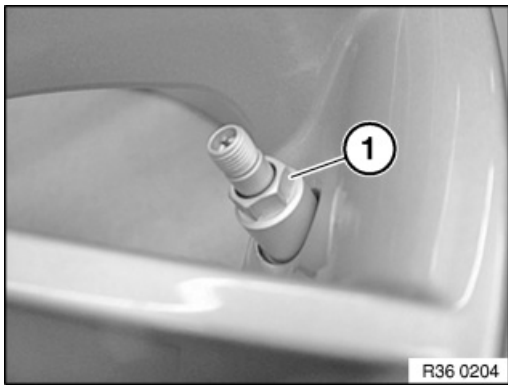
Make sure square bolt-head (1) is correctly seated in wheel electronics holder.



Insert valve insert with wheel electronics into cleaned valve bore.

Both outer feet on the underside of the wheel electronics module must be resting against the rim wall.





Screw on union nut (1) by hand as far as it will go.

Tighten union nut until the inner strip-off ring breaks. Breakage is perceptible audibly and tangibly (momentary drop in torque resistance).

Then fully tighten union nut (1).

Tightening torque 36 11 1AZ.

Attention!

Fixing must not under any circumstances be retightened!

The square-head bolt should be located precisely in the wheel electronics mounting.

The wheel electronics should still be resting evenly against the wheel rim after tightening.



36 12 ... Notes and specifications for tyre / wheel exchange

General:

- The tyre size, manufacturer and tyre tread must be the same on one axle
- To meet the BMW standards, the vehicle should be equipped with tyres from the same manufacturer and with the same tyre tread (tyres approved by BMW) on all 4 wheels
- The difference in tyre tread depth on one axle must not exceed 2 mm (control quality of suspension control systems and wheel alignment requirement)
- The tyres with the higher tread depths must be mounted on the rear axle
- The DOT age difference must not exceed 4 years
- The tyre pressure must be adjusted when the tyres are exchanged

Wheel exchange between the axles

The wheels may be exchanged between axles to achieve even abrasion. However, BMW does **not recommend** switching the front wheels to the rear or vice-versa.

The wheel exchange may lead to the following customer complaints:

- complaints regarding acoustics
- Risk of increased lane groove sensitivity

Compliance with the following requirements is required when exchanging wheels between the axles:

- Assess the wear pattern
- The tread difference between the front and rear wheels must not exceed a maximum of 2-3 mm
- Exchange the wheels between the axles every **5000 Km**

Additionally for all-wheel drive vehicles:

- The tyre size, manufacturer and tyre tread must be identical on all wheels; different tyre sizes between front and rear axles are only permissible if mixed tyres are fitted.
- The tyre tread difference between tyres in all wheel positions must not exceed **2 mm** (normal quality of the wheel control systems and wheel alignment requirement)



**Note:**

Follow the tyre fitting machine manufacturer's operating instructions.

It is absolutely essential to ensure that the equipment is in proper working condition and that there is no damage to the disc wheel and tyre.

Balance wheels after completing work.

UHP tyre = Ultra High Performance tyre

UHP tyres are tyres with an aspect ratio (H:B) $\leq 45\%$ or tyres with a speed index $\geq "V"$.

**Attention!**

For installation and removal work on run-flat tyres and/or UHP tyres on certified and approved tyre fitting machines, the following successful training for the "Certified BMW tyre fitter" is required. (See BMW training programme)

For the installation run-flat tyres and/or UHP tyres, only tyre fitting machines approved and certified by WDK (Wirtschaftsverband der deutschen Kautschukindustrie) (German rubber industry) may be used.

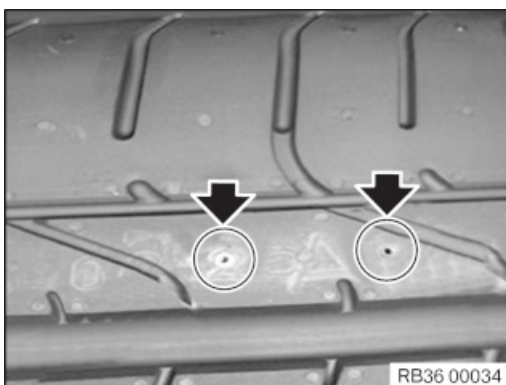
Please refer to the operating instructions of the respective tyre fitting machine for details of the exact fitting procedure.

Use only BMW-approved plastic-covered mounting levers!

Use only BMW-approved tyre-fitting paste.

For approved wheel and tyre combinations, tyre makes and optional equipment, refer to KSD CD.

When tyre sealant is used, the installed wheel electronics must necessarily be replaced.

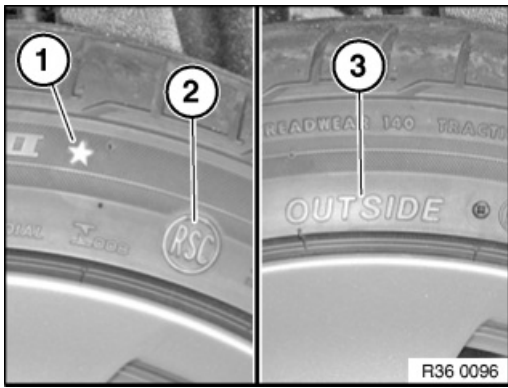
**Attention!**

Pirelli tyres can happen to have two little holes in the tread pattern!

These two holes are production-related!

The presence of these two little holes in the tread pattern does not represent a fault and does not affect the performance and the efficiency of the tyres in any way!





Note:

Pay attention to different tyre markings:

- **Position (1)** identification of BMW-approved tyres. Ensure that only BMW-approved tyres are fitted.
- **Position (2)** RSC is the abbreviation for **R**un-flat **S**ystem **C**omponent (runflat tyres).
- **Position (3)** Outside means outer side. The tyre must be fitted so that the wording Outside is always situated on the outside of the rim.

Attention!

Many tyres are directional!

The arrow on the tyre must point in the "Forward" direction of rotation!



Attention!

Before removal:

- Maintain tyre air temperature of approx. +23°C. Refer to Recommendation for heating.
- Clean wheel/tyre unit
- Remove valve insert (deflate tyre)
- Remove present balance weight



Observe before installation:

- Maintain tyre air temperature of approx. +23°C. Refer to Recommendation for heating
- Clean wheel/tyre
- Check wheel rim for burrs, wear and other damage
- Clean the tyre beads and check for evidence of damage.
- Check the wheel electronics for damage.
- The aluminium screw valve must be renewed at the disassembly of the wheel electronics.





Filling/inflating tyre:

Remove all fitting aids.

Attention!

Possibilities for safely mounting the wheel or incorporation in inflation apparatus should be utilised.

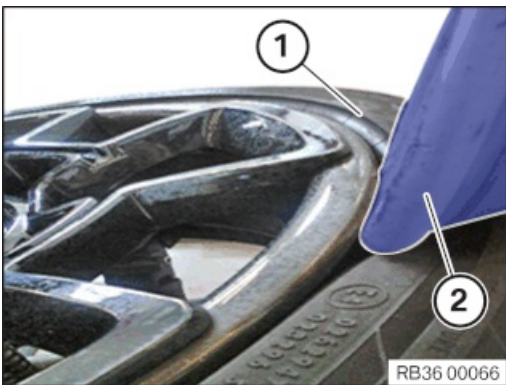
Observe instructions/conditions of trade association.

Observe national regulations!

Inflate with air (without valve insert).

- Increase pressure up to 3.3 bar in stages (fitting pressure).
- If the tyre bead does not slip fully past the rim edge all round, do not under any circumstance increase the pressure.
- If necessary, release air and force off tyre bead again.
- Coat the rim edge and the tyre with tyre paste once again.
- Inflate tyre again up to 3.3 bar.
- When tyre beads are resting perfectly on rim shoulders, increase tyre pressure to maximum 4.0 bar (settling pressure) to "settle" the tyre.

Screw in valve insert and correct the tyre pressure.



Optimise the tyre bead (1) fit on the inside and the outer side after inflating the tyre.

The tyre bead must lie flush against the wheel rim without air pockets. This optimises the smooth running of the tyre.

Gently press in the tyre sidewall and the wheel rim with the unseating roller (2).

Rotate the wheel, the air between the tyre and wheel rim escapes.

Balance the tyres.



Observe the notes on the initialisation of the tyre pressure control (RDC). **Attention!**

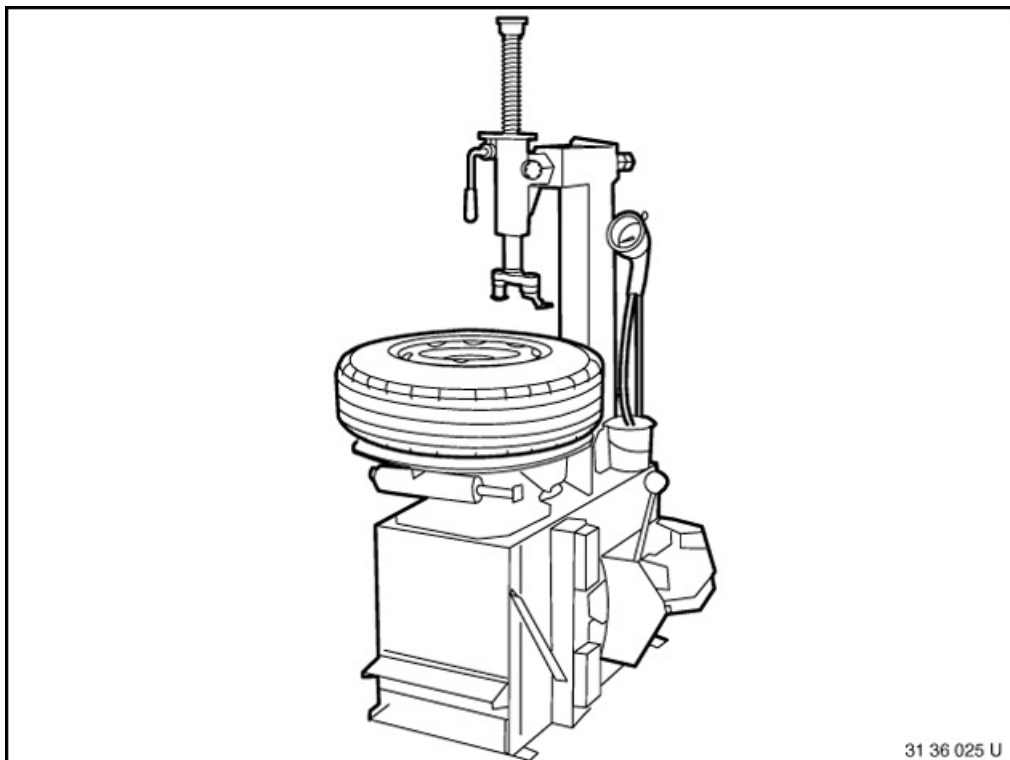
Advise the customer to avoid heavy acceleration and heavy braking in the initial period.

The assembly paste can cause the tyre to turn on the wheel rim and give rise to imbalance.





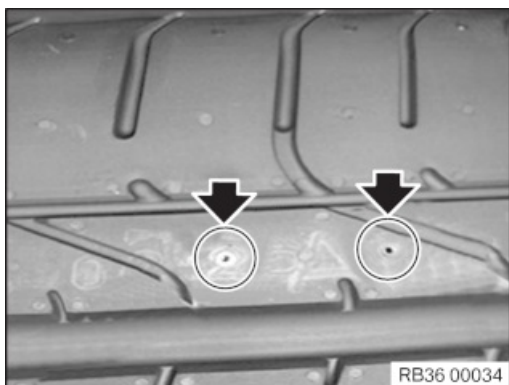
Note:
Follow instructions for initialising the Run Flat display.



31 36 025 U



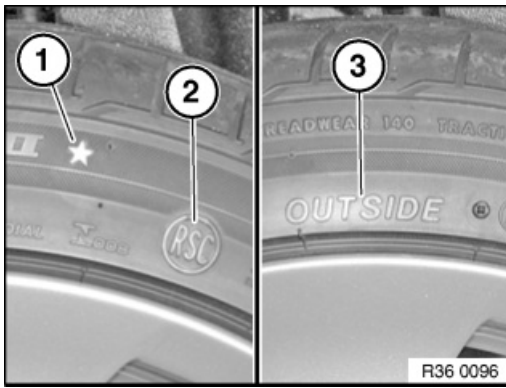
Refer to the operating manual of the relevant fitting equipment manufacturer for details on how to fit the tyre correctly. The devices need to be in perfect condition in order to eliminate damages of the disc wheel and of the tyre. *Note:*
Comply with approved tyres, tyre sizes and optional equipment.

**Important!**

Pirelli tyres can happen to have two little holes in the tread pattern!
These two holes are production-related!

The presence of these two little holes in the tread pattern does not represent a fault and does not affect the performance and the efficiency of the tyres in any way!





Note:

Pay attention to different tyre markings:

- **Item (1)** Marking denoting BMW-approved tyres. Ensure that only BMW-approved tyres are fitted.
- **Item (2)** RSC is the abbreviation for **R**unflat **S**ystem **C**omponent (runflat tyres).
- **Item (3)** Outside. The tyre must be fitted so that the wording Outside is always situated on the outside of the rim.

Important!

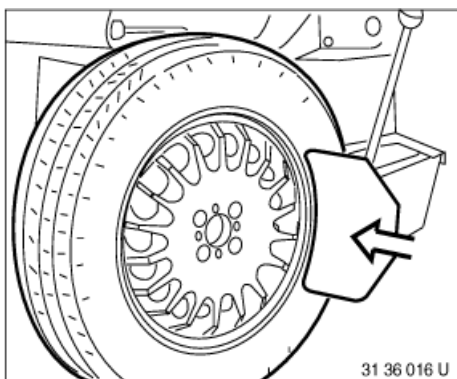
Many tyres are directional!

The arrow on the tyre must point in the direction of travel for each wheel!



Models with M Mobility system

If the tyre was filled with the M-Mobility system after a puncture, it will be necessary before removal to drill an approx. 25 mm dia. hole in the side wall of the tyre. Allow sealing compound to flow out through this bore hole and dispose of sealing compound in compliance with environmental regulations. The disc wheel has to be cleaned after disassembly of the tyre.



Tyre removal with a tyre fitting machine:

Unscrew valve insert, discharge air, force off tyre bead from rim flange with pressing-off tool of the device on outside and inside.

If tyre beads are stuck, first release the tyre with the pressing-off horn at several points of the wheel before actually pressing off, apply tyre mounting paste between tyre and rim flange and press off the tyres completely.

Pull off balance weights on wheel rim and clean rim to remove large pieces of dirt.

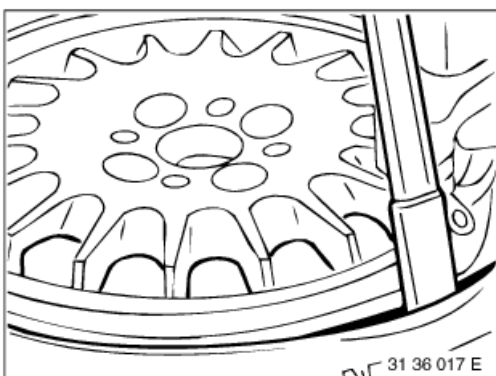
Clamp wheel on tyre fitting machine.

Narrow rim shoulder always faces upwards.

Important!

Vehicles with RDC:

In order to prevent the pressing-off tool from damaging the RDC wheel electronics, do not position the pressing-off tool in the area around the valve on both rim sides.



Swing or fold mounting column into position and let it engage.

Adjust mounting head, pressing it on the rim edge fully, and turn down the lever for the clamp; normally the distance of the mounting head will set in automatically.

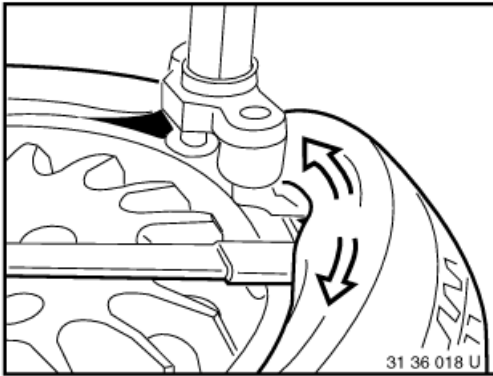
The valve needs to be approx. 15 cm to the right of the mounting head (so as to prevent the mounting lever from damaging the RDC wheel electronics).

Raise tyre bead with mounting lever over mounting finger.



**Note:**

On aluminium rims, it is best to use a mounting lever coated (either fully or partially) with heat-shrink tubing to prevent damage.

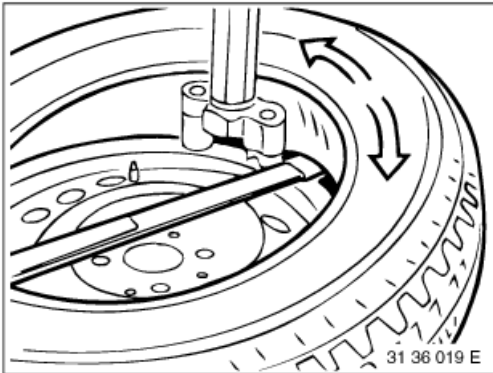


Let the tyre fitting machine run back a short distance (counterclockwise direction); the tyre bead will then slip fully onto the mounting finger.

Then let fitting machine run forward in stages (clockwise).

In so doing, always check whether the lower bead is fully resting in the well and allow the tyre time to move.

If the bead clamps, stop the machine and let it run back slightly.



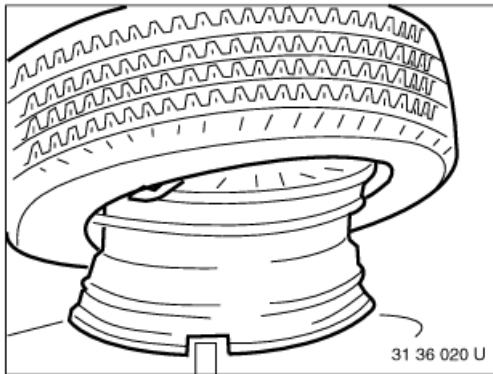
If the upper bead is pulled off the rim, also lift the bottom bead over the mounting finger with the tyre iron.

Let machine run back a short distance again and then forward (clockwise) briefly until there is complete separation of the tyre from the rim.

Important!

Vehicles with RDC:

The tyre bead must not press onto the RDC wheel electronics.



Release lock and tilt back or swing away mounting column.

Unclamp and clean rim.

Replace valve.

Coat rim flange and tyre beads with tyre-fitting paste (refer to BMW Parts Service).

Important!

Vehicles with RDC:

When the wheel electronics are installed, the rim must not be cleaned with high-pressure cleaning equipment.

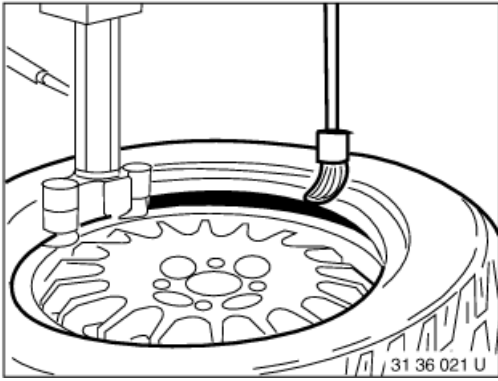
Visually inspect wheel electronics for external damage and check for tight fit; do not retighten screw and union nut. If valve parts are loose, the entire valve needs to be renewed.

Keep wheel electronics free of tyre mounting paste.

Clamp rim on fitting machine, valve must be located at 180° to mounting head.

Slide on tyre with lower bead partially over rim flange.





Swing or tilt mounting pillar into position and lock.

Check adjustment of mounting finger, readjusting if necessary, and clamp.

Press tyre under mounting finger by hand.

The tyre bead must seat next to the mounting finger in the roller.

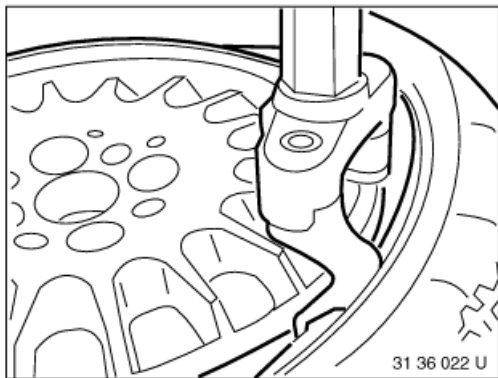
Let fitting machine run forward (clockwise) a short distance.

Lower tyre bead will drop into well.

Important!

Vehicles with RDC:

Mount the lower tyre bead so that no pressure forces are exerted on the RDC wheel electronics.



Turn wheel again into installation position so that valve is at 180° to mounting head.

Press upper tyre bead under mounting finger. Tyre bead must seat in rollers next to mounting finger.

Important!

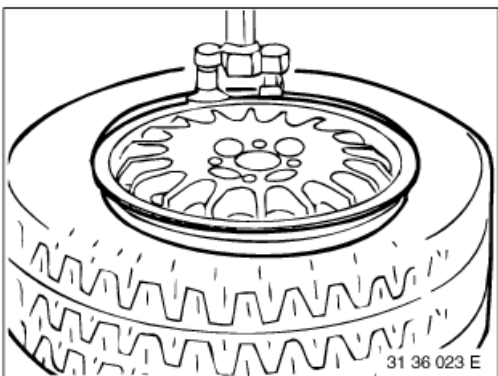
Do not pinch or damage bead.

Operate fitting machine forwards (clockwise) little by little; while doing so, make sure the lower tyre bead remains in the well.

Important!

Vehicles with RDC:

Mount the upper tyre bead so that no pressure forces are exerted on the RDC wheel electronics.



Important!

Possibilities for safely mounting the wheel or incorporation in inflation apparatus should be utilised!

After mounting, first release clamping claws and then inflate tyre (without valve).

Increase pressure up to 3.3 bar (330 kPa) in steps (jumping pressure).

If the tyre bead does not slip on all round at the rim edge, do not increase pressure further but rather drain off air.

Press off tyre bead again, coat rim flange again with tyre mounting paste, refer to BMW Parts Service, and pump up again to 3.3 bar. When the beads are resting properly on the rim shoulders, increase inflation pressure to max. 4.0 bar to "settle" the tyre.

Screw in valve insert and correct tyre pressure.



Important!

Advise the customer to avoid heavy acceleration in the initial period.

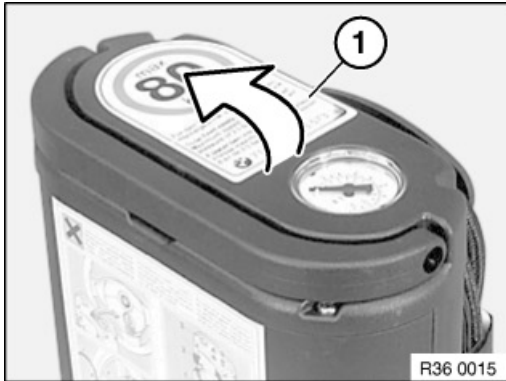
The assembly paste can cause the tyre to turn on the wheel rim and give rise to imbalance.



Note:

This work step describes how the sealant bottle is replaced within the framework of inspection (M-Mobility system not used).

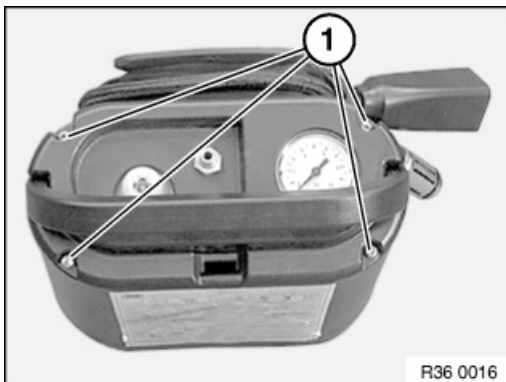
If the M-Mobility system has been used, also replace the transparent tyre inflation hose.



Remove seal film (1). Not necessary if M-Mobility system has already been used.

Installation:

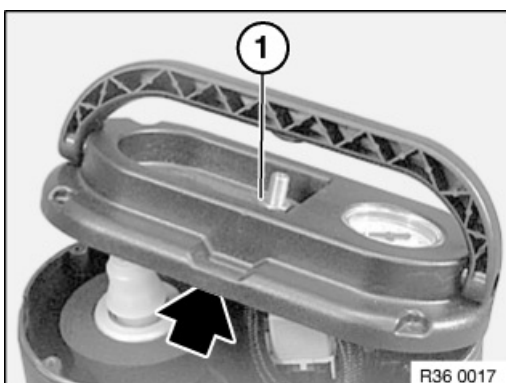
Replace seal film.



Release Torx threaded bolts (1) and raise cover as far as possible.

Installation:

Tightening torque, 36 12 1AZ.

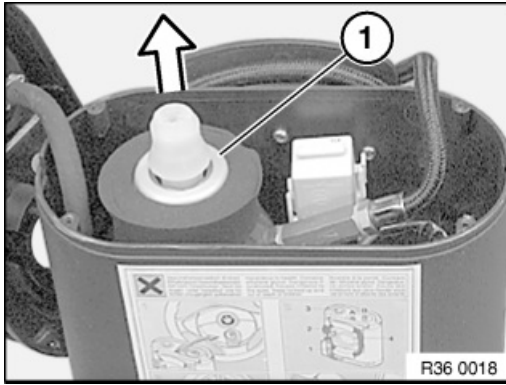


Release hexagon nut (1), grip nut firmly from underside.

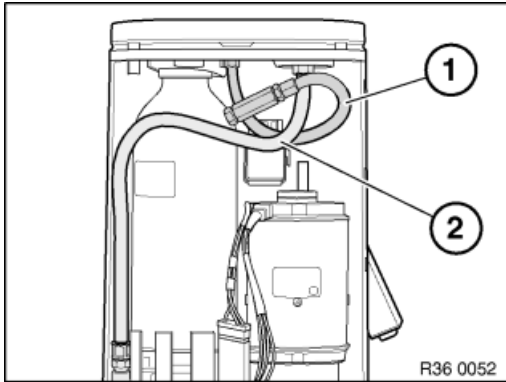
Installation:

Tightening torque, 36 12 2AZ.

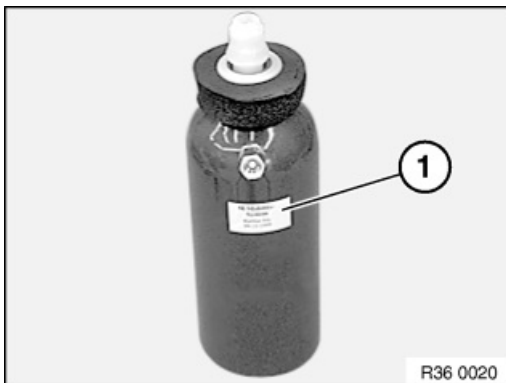




Lift sealant bottle out.



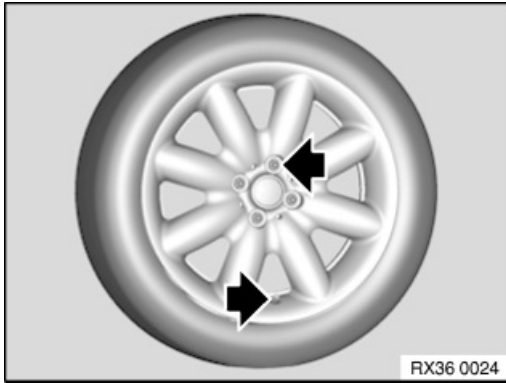
Ensure that hose is laid without any kinks.



Note:

Note the expiration date when installing a new sealant bottle.





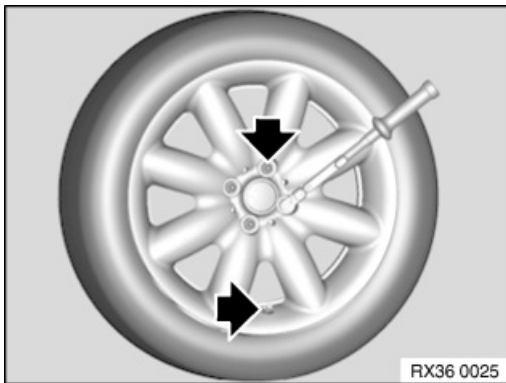
Loosen wheel bolts.

Raise car so that wheel can be turned freely.

Release wheel studs to such an extent that the wheel can move freely on the wheel hub.

Turn wheel so that valve is face down.

Remove top wheel stud and insert wheel stud lock.



Possible play in wheel centre and wheel weight could cause imbalance.

This imbalance is reduced to a minimum by installing the somewhat heavier wheel-bolt lock in the top wheel-bolt position.

In this position - wheel stud lock at top, valve at bottom - tighten wheel studs hand-tight in diagonal sequence.

Lower car and tighten wheel bolts crosswise.

Tightening torque 36 10 1AZ.



36 12 ... Notes and specifications for tyre / wheel exchange

General:

- The tyre size, manufacturer and tyre tread must be the same on one axle
- To meet the BMW standards, the vehicle should be equipped with tyres from the same manufacturer and with the same tyre tread (tyres approved by BMW) on all 4 wheels
- The difference in tyre tread depth on one axle must not exceed 2 mm (control quality of suspension control systems and wheel alignment requirement)
- The tyres with the higher tread depths must be mounted on the rear axle
- The DOT age difference must not exceed 4 years
- The tyre pressure must be adjusted when the tyres are exchanged

Wheel exchange between the axles

The wheels may be exchanged between axles to achieve even abrasion. However, BMW does **not recommend** switching the front wheels to the rear or vice-versa.

The wheel exchange may lead to the following customer complaints:

- complaints regarding acoustics
- Risk of increased lane groove sensitivity

Compliance with the following requirements is required when exchanging wheels between the axles:

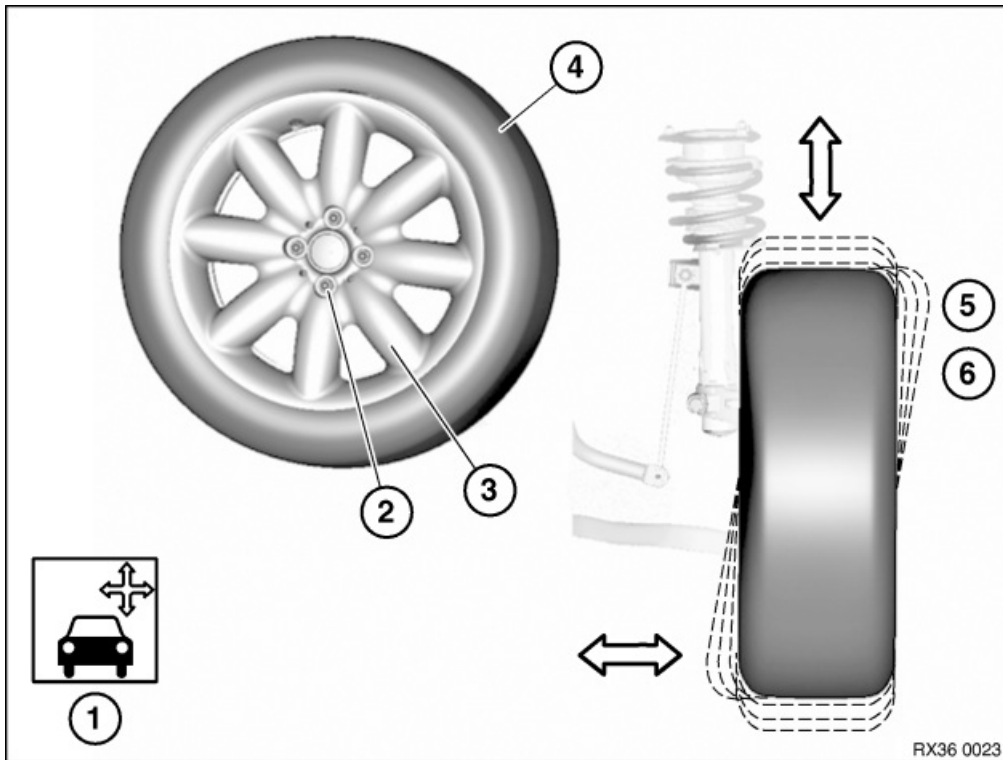
- Assess the wear pattern
- The tread difference between the front and rear wheels must not exceed a maximum of 2-3 mm
- Exchange the wheels between the axles every **5000 Km**

Additionally for all-wheel drive vehicles:

- The tyre size, manufacturer and tyre tread must be identical on all wheels; different tyre sizes between front and rear axles are only permissible if mixed tyres are fitted.
- The tyre tread difference between tyres in all wheel positions must not exceed **2 mm** (normal quality of the wheel control systems and wheel alignment requirement)



36 Overview of wheels and tyres



- 1 Initialize Run Flat Indicator
- 2 Locking wheel bolts
- 3 Remove and install wheel
- 4 Replace tyre
- 5 Tyre imbalance
- 6 Rim imbalance



36 00 ... Recommendation for heating tyres before removing or fitting

Recommendation for heating cold tyres to minimum fitting temperature +15 °C:

To ensure injury-free tyre fitting, in particular the upper sidewall and the upper bead must have a temperature of at least 15 °C on the inside.

To ensure easier tyre fitting, a temperature of 20° to 25° C is recommended.

This internal temperature is called the core temperature.

Rubber is a poor conductor of heat; for this reason, a cold tyre must rest for a sufficient length of time in a warmed-up environment until the inner rubber layers have warmed up to min. 15 °C.

The surface temperature of the tyre during the warm-up phase is not a measure of the internal temperature!

The room temperature is normally measured and read off at eye level. At 19 °C at eye level the temperature on the floor is approx. 16 °C. In other words, do not lay tyres directly on a cold floor to warm up; instead, lay them at least on an insulating surface, such as a pallet, or even higher.

To ensure that cold tyres absorb the heat from the ambient air as quickly as possible, they should not be stacked but rather stored individually so that they are thoroughly "immersed" in the warm ambient air.

Do not under any circumstances place tyres in front of a radiant heater or a hot air blower as harmful surface temperatures are very quickly reached in this situation. Apart from heating with warm water or with warm recirculated air (max. 50 °C, no hotter), there is no other way of heating a tyre without damaging the tyre!

If a cold tyre (under 0 °C) is introduced into a warm environment (over 0 °C), a layer of frost will form immediately on the tyre surface. This frost layer shows that the tyre is absorbing heat intensively from its surroundings through condensation of the moisture in the air. When the frost layer has melted and condensation water forms, dry off this water with a cloth so that the subsequent warming-up process is not slowed down by latent heat.

Summary:

Starting from a min. room temperature of 19°C:

- Tyres at initial temperature of 0 °C and higher: store for min. 2 h
- Tyres at initial temperature below 0 °C: store for min. 2.5 h

Recommendations for heating:

- Store on an insulating surface - a pallet or similar - at as high a level as possible
"Upper" bead facing upwards
- Position tyres individually so that they can be thoroughly "immersed" in warm air
- Wipe off condensation water
- Do not point heaters at tyres



00 Danger of injury if oil comes into contact with eyes and skin



Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin



Protective measures/rules of conduct:

- Wear safety goggles.
- Wear oil-resistant protective gloves.
- Observe country-specific safety regulations.



First aid measures:

- Eye contact: Immediately rinse out eyes with lots of water and for at least 15 minutes. In the case that it is available, use an eye wash bottle. If eye irritation persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

Note: Do not use solvents/thinners.



**Danger of poisoning!**

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

**Protective measures/rules of conduct:**

- Fill oil in appropriately marked containers only.
- Do not pour oil in drinking vessels (beverage bottles, glasses or cups).
- Observe country-specific safety regulations.

**First aid measures:**

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.



00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



Warning!

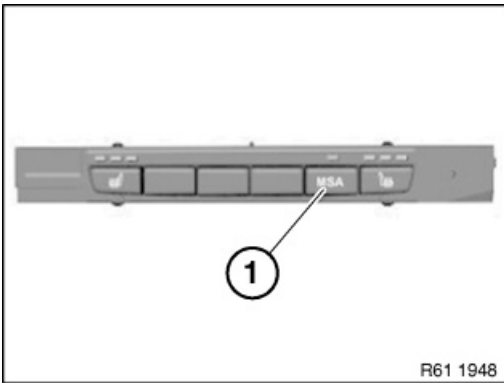
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

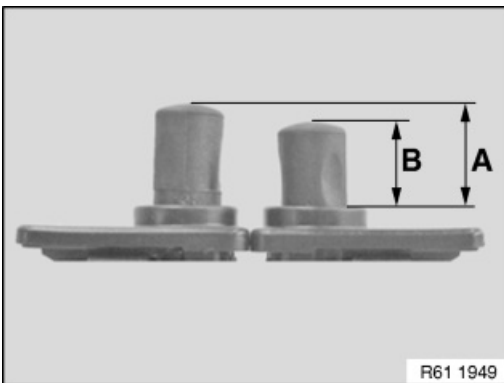
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode
 $A = 10 \text{ mm}$
 - Basic setting (engine hood/bonnet open)
 $B = 7 \text{ mm}$

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



When working with diagnosis tools:

- Observe instructions in diagnosis tool





Note:

For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) Service Information (bulletin) 61 01 07 335
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) Service Information (bulletin) 61 01 10 629



**Warning!**

Danger of poisoning if oil is ingested/absorbed through the skin!

Risk of injury if oil comes into contact with eyes and skin!

**Recycling:**

Observe country-specific waste disposal regulations.

**Measures if oil is unintentionally released:**

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

Note: Do not flush oil away with water or aqueous cleaning agents.

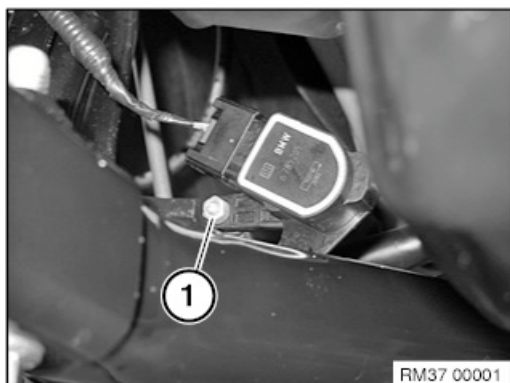


**Important!**

Observe safety instructions for raising the vehicle

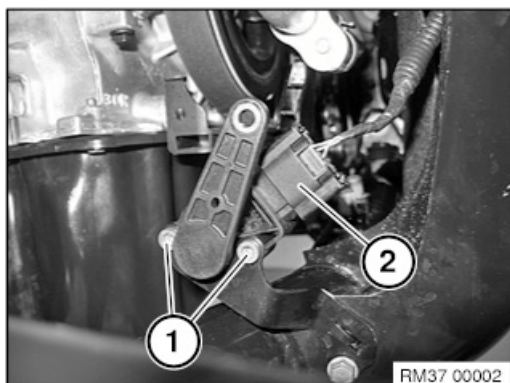
**Important!**

Read and comply with notes on protection against electrostatic damage (ESD protection).



Undo nut (1) from link at ride-height sensor. *Installation note:* Replace self-locking nut.

Tightening torque 37 14 4AZ.



Move sensor lever upward.

Undo screws (1), release plug connection (2) and disconnect.

Tightening torque 37 14 1AZ.

**After installation:**

- Check headlight setting, correct if necessary



37 14 512 Replacing rear ride-height sensor



Important!

Observe safety instructions for raising the vehicle

Note:

Ride-height sensor holder on rear axle carrier 37 14 3AZ.

Jointed rod to holder 37 14 4AZ.

Holder to upper control arm 37 14 5AZ.



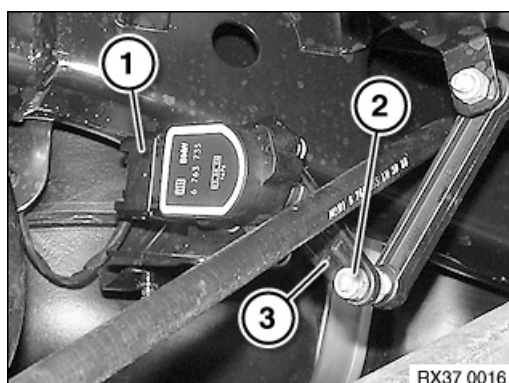
Important!

Read and comply with notes on protection against electrostatic discharge (ESD protection).



Necessary preliminary tasks:

- Partially detach underbody panelling



Disconnect plug connection (1).

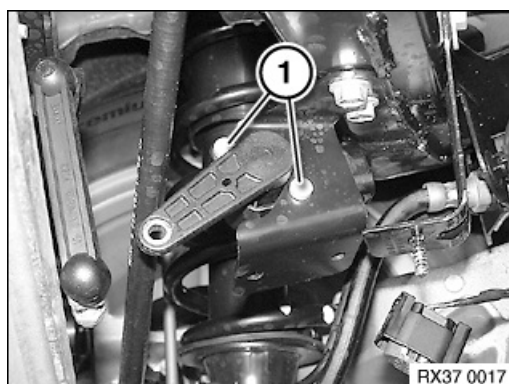
Release nut (2) and remove jointed rod from sensor lever (3).

Installation:

Replace self-locking nut.

Sensor lever (3) must point from ride-height sensor to lower control arm.

Tightening torque 37 14 4AZ.



Release screws (1) and remove ride-height sensor.

Installation:

Tightening torque 37 14 1AZ.



After installation:

- Check headlight adjustment, correct if necessary



41 00 ... 0 Contents of Body, General

Before beginning repair work	<ul style="list-style-type: none">- Checking the body for damage (e.g. following an accident)	
General notes	<ul style="list-style-type: none">- Quality standard	<ul style="list-style-type: none">- Workshop equipment
Safety regulations	<ul style="list-style-type: none">- Safety at work- Information on vehicle protection	<ul style="list-style-type: none">- Information on hazards
Material/new part	<ul style="list-style-type: none">- Materials science- Expendable materials	
Handling components	<ul style="list-style-type: none">- Electrical system, electronics and optical fibre- Flood damage- Passive safety- Chassis and suspension and steering- Retractable hardtop	<ul style="list-style-type: none">- Vehicles with hybrid/electric drive- Seats/seat belts- Wheel rim repairs- Headlight repairs
Cavity sealing	<ul style="list-style-type: none">- Installation of shaped parts- Position of shaped parts	
Vehicle identification number	<ul style="list-style-type: none">- General notes	
Repair method	<ul style="list-style-type: none">- Repair stage 1a- Repair stage 1b- Repair stage 2- Repair stage 3	<div>BMW/MINI/BMW i</div> <ul style="list-style-type: none">• Replacement of screwed-on components <div>BMW/MINI/BMW i</div> <ul style="list-style-type: none">• Repairs to outer skin <div>BMW/MINI</div> <ul style="list-style-type: none">• Bonding and riveting• Welding using a MAG welder• without straightening bench <div>BMW i</div> <ul style="list-style-type: none">• Repairs to life module• Repairs to drive module• without straightening bench <div>BMW/MINI</div> <ul style="list-style-type: none">• Bonding and riveting• Welding using a spot welding system• with a straightening bench <div>BMW i</div> <ul style="list-style-type: none">• Repairs to life module• Repairs to drive module• with a straightening bench
Corrosion protection	<ul style="list-style-type: none">- General notes	



Paint

- General notes
- Information / warning labels



41 ... 0 Notes on the repair technique used in the main group 41

Two different repair techniques are used in body repair.

These are welding and bonding/riveting.

If the repair instructions do not specify a repair technique, then welding must **always** be used.

The bonding/riveting repair technique is **always** described in detail in the repair instructions.

Quality standards must be met.



41 00 ... Blind rivet

1.0 Recommended tools and equipment

- Blind riveting tongs
- Rivet head extension

Sourcing reference BMW Workshop equipment catalogue

Setting blind rivets:

- Refer to repair instructions for rivet size.
- Position bore holes for blind rivets in accordance with specification in repair instructions. If necessary, carry over the positions of the blind rivets to the new part.
- Drill holes that exceed the outer diameter of the blind rivet (example \varnothing 4.2 mm with 4 mm blind rivet and \varnothing 6.8 mm with 6.5 mm blind rivet).
- The edge of the hole must even on both sides. If necessary, sand down and even out surfaces (e.g. edges of punch rivet connections). Deburr bore holes.
- Apply adhesive.
- Insert blind rivet. If necessary, remove adhesive that has emerged.
Position blind rivet tool vertically. Use rivet head extension if accessibility is poor.
- Rivet blind rivet with blind rivet tool. In the meantime clean rivet head if dirty with adhesive. Risk of damage to rivet head by penetrating adhesive.
- Seal blind rivet with sealant D1 (risk of corrosion).
- Seal cavities after work on vehicle paintwork on with cavity preservation (risk of corrosion).



41 00 ... Bonding on painted/primed surfaces

Attention!

These repair instructions apply only to components of the outer skin and not to structural components.

These include roof outer skin, tail panel, rear side panels and components of the luggage compartment floor.

Follow the vehicle-specific repair instructions.

Only the repair method described there must be used!

Conform with safety regulations !

Overview of topics:

1. Equipment
2. Expiry date of consumables
3. Preparation of surface
4. Bonding coat
5. Hardening times
6. Subsequent treatment
7. Disposal of adhesive

1.0 Equipment

- Cleaning agent R1
- Cleaning agent R2
- Adhesive K5
- Cartridge gun

2.0 Expiry date of consumables:

- Glue cartridge is marked with a date.
- Do not use adhesive after this date.

3.0 Preparation of surface:

3.1 Preparation of the surface on the vehicle (series status):

- Establish a level bonding surface (e.g. grinding).
- **Do not sand primed bonding surfaces.**
If the bonding surface is painted in the vehicle colour, the paint must be completely sanded off.
- If necessary, pre-clean the bonding surfaces with cavity protection wax remover.
Clean bonding surfaces with cleaning agent R1.
- Allow cleaned surfaces to dry for approx. 5 min.
Bonding surfaces must be completely dry.

3.2 Preparation of the surface on the vehicle (replacement of a bonded component):

- Remove adhesive residue completely from vehicle. Remove all the existing reinforcement plates if necessary (e. g. rear side panel).
- **Do not prime in the area of the bonding surfaces!** Adhesive insufficiently bonds to primer.
If priming is needed after straightening work, cover the bonding surfaces.
- If necessary, pre-clean bonding surfaces with cavity sealing wax remover.
Remove coarse dirt from the bonding surfaces using solvent cleaner R2.
Clean bonding surfaces with cleaning agent R1.
- Allow cleaned surfaces to dry for approx. 5 min.



Bonding surfaces must be completely dry.

3.3 Preparation of surface on new part:

- Do not remove primer on new part.
Do not grind/sand bonding surfaces.
- Remove coarse dirt from the bonding surfaces using solvent cleaner R2.
- Clean bonding surfaces with cleaning agent R1.
- Allow cleaned surfaces to dry for approx. 5 min.
Bonding surfaces must be completely dry.

4.0 Adhesive application:

- Processing temperature of glue cartridge 18 °C - 30 °C.
- Object temperature, vehicle and new parts, at least 15°C.
- Do not use an air-powered cartridge gun.
- Insert glue cartridge into cartridge gun, remove cap and allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube.
- Allow approx. 10 cm of mixed adhesive to emerge and then apply the mixed adhesive first on one side of the bonding surface.
- After applying the adhesive, check whether an adhesive component has emerged at the back of the glue cartridge. If yes, break off the bonding procedure. Clean new part. Use new glue cartridge. Contact national hotline.
- Pot life of mixed adhesive approx. 2 h. A change of mixer is necessary only if no material has flowed through the mixer for a period of 30 min.
- Join components and secure in position.
- Remove excess adhesive.

5.0 Hardening times:

- **Do not move the vehicle before the adhesive has hardened.**
Check the degree of hardness of the adhesive with a fingernail.
If the adhesive cannot be pressed in any further with a fingernail, the vehicle may be moved (without engine force) for further processing applications (e.g. painting).
- Vehicle **strength for driving applications** is achieved after:
48 h at an object temperature of at least 15 °C (corresponds to approx. 18 °C room temperature).
Or 1 h in the spray booth (spray booth temperature 80 °C/object temperature 60 °C).
- When using radiant heaters, make sure that the object temperature does not exceed 85 °C. Excessively high temperatures will destroy the adhesive.
- Remove contamination caused by adhesive residue immediately.
Hardened adhesive can only be removed mechanically.

6.0 Subsequent treatment:

- Reseal areas which are cavity-sealed as standard.

7.0 Disposal of adhesive:

- Hardened adhesive is disposed of as normal waste.
- Empty glue cartridges are disposed of as normal waste.
- Non-hardened adhesives and mixtures of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.



41 00 ... Bonding steel on steel

Attention!

These repair instructions apply to structural components.

Such components include engine supports, A-pillars, B-pillars, etc.

Follow the vehicle-specific repair instructions.

Only use the repair procedures described there.

Conform with safety regulations!

Overview of topics:

1. Equipment
2. Preparing the surface
3. Bonding coat
4. Hardening times
5. Subsequent treatment

1.0 Equipment

- Sandpaper
- Cleaning agent R1
- Cleaning agent R2
- Adhesive K1
- Cartridge gun

2.0 Preparing the surface:

- Remove coarse dirt from the bonding surfaces using solvent cleaner R2.
- Clean bonding surfaces using R1 solvent cleaner prior to sanding.
- Remove paint from bonding surfaces using a wire brush or sandpaper with 120 graining.
- Clean bonding surfaces with cleaning agent R1.
- Allow cleaned surfaces to dry for approx. 5 minutes.
Bonding surfaces must be completely dry.

3.0 Adhesive application:

- Processing temperature of glue cartridge 18 °C - 30 °C.
- Object temperature, vehicle and new parts, min. 15°C.
- After applying the adhesive, check whether an adhesive component has emerged at the back of the glue cartridge. If yes, break off the bonding procedure. Clean new part. Use new glue cartridge. Contact national hotline.
- Join components and secure in position.
- Remove excess adhesive. Do not use solvent cleaning agents.

4.0 Hardening times:

- Refer to Notes regarding adhesive K1

5.0 Subsequent treatment of bonding surfaces:

- Protect the repair area with cavity sealant.



72 11 ... Checklist for front seat

Event		Check	Action
Has at least one belt tensioner and/or one side airbag been activated?	Yes	Check 1 (when installed): Check all seat adjustment options of both front seats. There must be no stiff movement, sticking or other functional problems or noises across the entire adjustment range of all the seat adjustment options. Check head restraints for damage. Check crash-active headrest for activation. Only 2-door model: Check backrest lock. Backrest must unlock and lock easily without any great physical effort.	If components are OK with regard to checks 1 and 2, only replace activated belt tensioner or side airbag. Otherwise, replace faulty parts on the seat/body. Replace belt tensioner, seat belt and, if necessary, side airbag.
		Check 2 (when dismantled): Check for deformation/damage on the following components: 1. All seat cross members on the body 2. Threaded support sleeves in the seat cross members 3. End fittings on the seat mechanism. Check for visible damage or deformation.	
	No	Check all adjustment options of the head restraints. Check crash-active headrest for activation.	Replace faulty parts.
Only seat with integrated seat belt:			
Does the backrest indicator light turn on when the backrest is locked and also when the backrest is shaken?	Yes	Check microswitch of backrest lock and renew if necessary. Check electrical lines and repair if necessary.	If there is still a fault, replace the entire seat
	No	No further action necessary.	



41 00 ... Corrosion protection

Note:

Following repairs, the corrosion protection work already begins with the correct removal of the underbody protection, anti-drumming layer and seam sealing in the repair area.

The products recommended by BMW are optimized with regard to corrosion protection.

1.0 Removing and applying sealant:

1.1 Removing sealant:

Important!

- Do not burn off PVC material (sealant) with an autogenous torch or similar or heat to temperatures above 180 °C. This would generate highly corrosive hydrochloric acid and release harmful vapour.
- The new sealant does not adhere appropriately to burnt polyvinyl chloride material and hence subsequent rust creep is possible.

Remove PVC material with a rotating steel brush, or heat PVC to maximum 180 °C with a hot air blower and scrape off with a spatula.

1.2 Applying sealant:

Prime and seal all weld seams that are sealed with sealant in original condition immediately after repair work. Replace damaged or removed anti-drumming layers.

Note:

Required spray gun for sealant (order number 81 49 0 300 887).

Seal blind rivet with sealant (risk of corrosion).

Seal affected cavities with cavity preservation (risk of corrosion).

2.0 Basics of cavity preservation:

Apply cavity preservation after all body repairs.

Concluding cavity preservation is the most important part of all corrosion protection measures.

Use the cavity protection spray only for smaller-scale straightening work where the parts in question are easily accessible. Use the pressure cup gun for all other repairs. Cavity protection agent is available in different container sizes.

Use the relevant sensors with tubes for the different cavity areas.

Required tools can be found in the Aftersales Assistance Portal (ASAP) - Service/Technology - Workshop Equipment (Start BMW) - Shop Workshop Equipment or at www.bmwgroup-wep.com.

Important!

Incorrectly performed cavity protection can, especially in the case of steel/aluminium joints, give rise to a non-calculable product liability and safety risk.

The best repair is worth nothing if the subsequent cavity protection measures are not conscientiously carried out.

2.1 Cavity preservation of steel parts:

New doors and lids must be sealed with cavity protection agent after being painted.

New sheet-metal parts or cavities, weld seams and folds formed by new sheet-metal parts must be sealed



with cavity protection agent after being painted.

The cavities affected must be sealed with cavity protection agent after all straightening work.

2.2 Cavity preservation of aluminium parts:

New doors, lids and side panels made of aluminium are not sealed with cavity protection agent.

After all straightening work on aluminium components, the cavities affected must be sealed with cavity protection agent after being painted.

After all welding work (E52 only) on aluminium components, the cavities affected must be sealed with cavity protection agent after being painted.

Cavities, seams and folds formed from new sheet metal parts or extruded profile must be sealed with cavity protection agent after being painted.



41 00 ... EMC screws

(EMC = electromagnetic compatibility)

1. Purpose:

- EMC screws are used in the bonding/riveting repair method to re-establish bonding transition.
- They adopt the task of welded connections, which handle bonding transition between the individual components in series production.
- The punch or blind rivets used in the repair do not guarantee permanent bonding transition between the individual components!
- The EMC screws ensure the operational reliability and safety of the electrical/electronic components following repairs!

2. Procedure for aluminium front end:

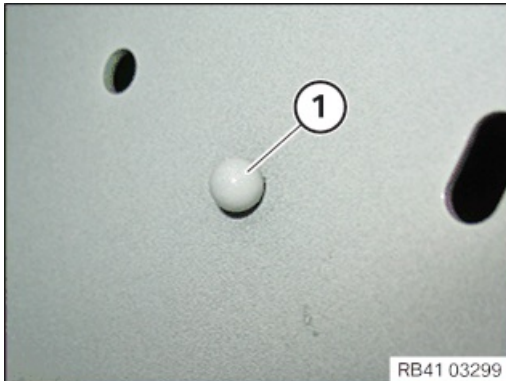
- Each welded joint which is opened must be replaced by at least 2 EMC screws.
- Position the 2 screws on the flange on which the weld seam has been separated. In the event of partial replacement, position the screws in the area of the component overlap.
- In the case of repairs using partial replacement, the number of EMC screws described in the repair instructions must be fitted.
- Drill holes to a diameter of 4.2 mm and insert screws.
- Seal EMC screws with PU sealing material (risk of corrosion).

3. Procedure, steel body:

- Install the number of EMC screws described in the repair instructions.
- Drill holes to a diameter of 4.2 mm and insert screws.
- Seal EMC screws with PU sealing material (risk of corrosion).



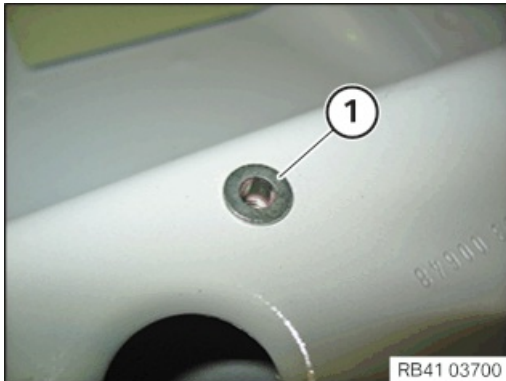
Note: On BMW and MINI bodies, various welded and pushed in bolts are being used.



Single ball/double ball (version 1):

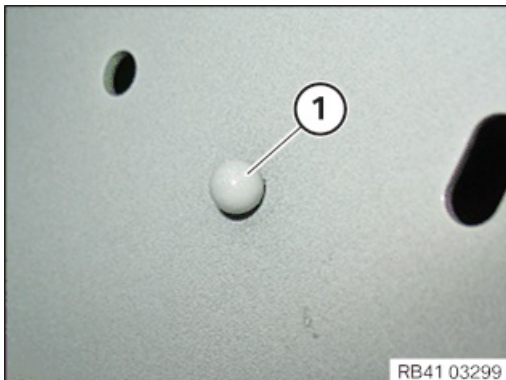
Grind off any residues of the single ball (1), if applicable.

Drill hole with diameter 7 mm.



Set blind rivet nut (1).

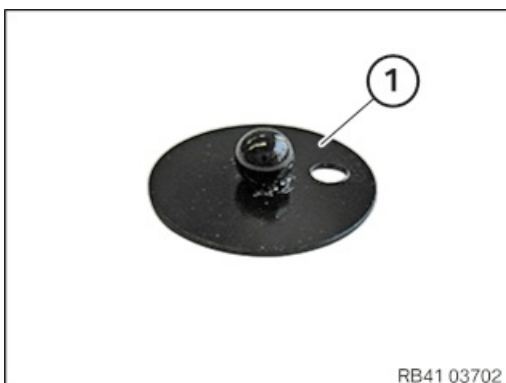
Screw in single ball with thread until a height of 5 mm (double ball 10 mm) is reached.



Single ball/double ball (version 2):

Grind off any residues of the single ball (1), if applicable.

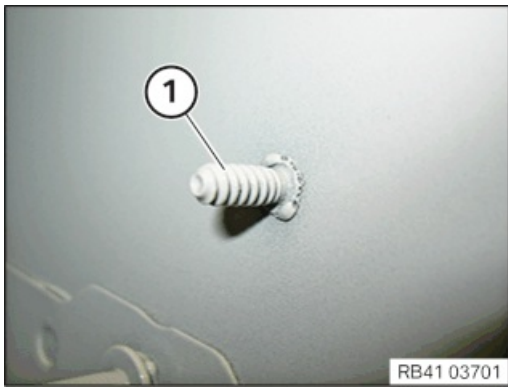
Clean area with solvent cleaner R1.



Clean bonding surface of repair element single ball (1) with solvent cleaner R1.

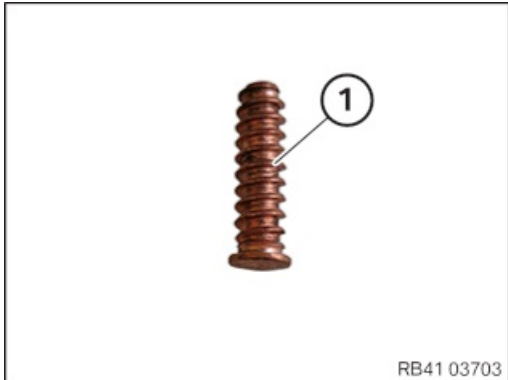
Bond repair element optionally with adhesive K1, K5 or window pane adhesive at the same position.



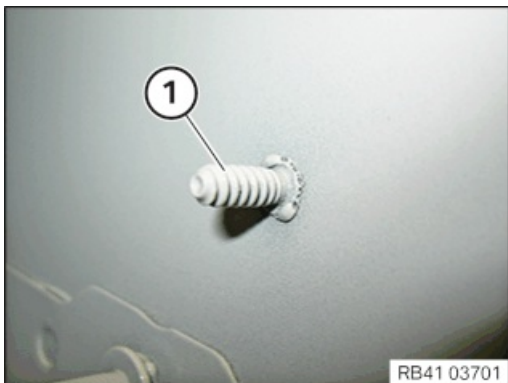


Coarse threaded bolt (version 1):

Grind off any residues of the coarse threaded bolt (1), if applicable.



Spot weld coarse threaded bolt to same position.



Coarse threaded bolt (version 2):

Grind off any residues of the coarse threaded bolt (1), if applicable.

Drill hole with diameter 7 mm.

Set blind rivet coarse threaded bolt using riveting pliers.



41 00 ... Frame alignment control dimensions, body

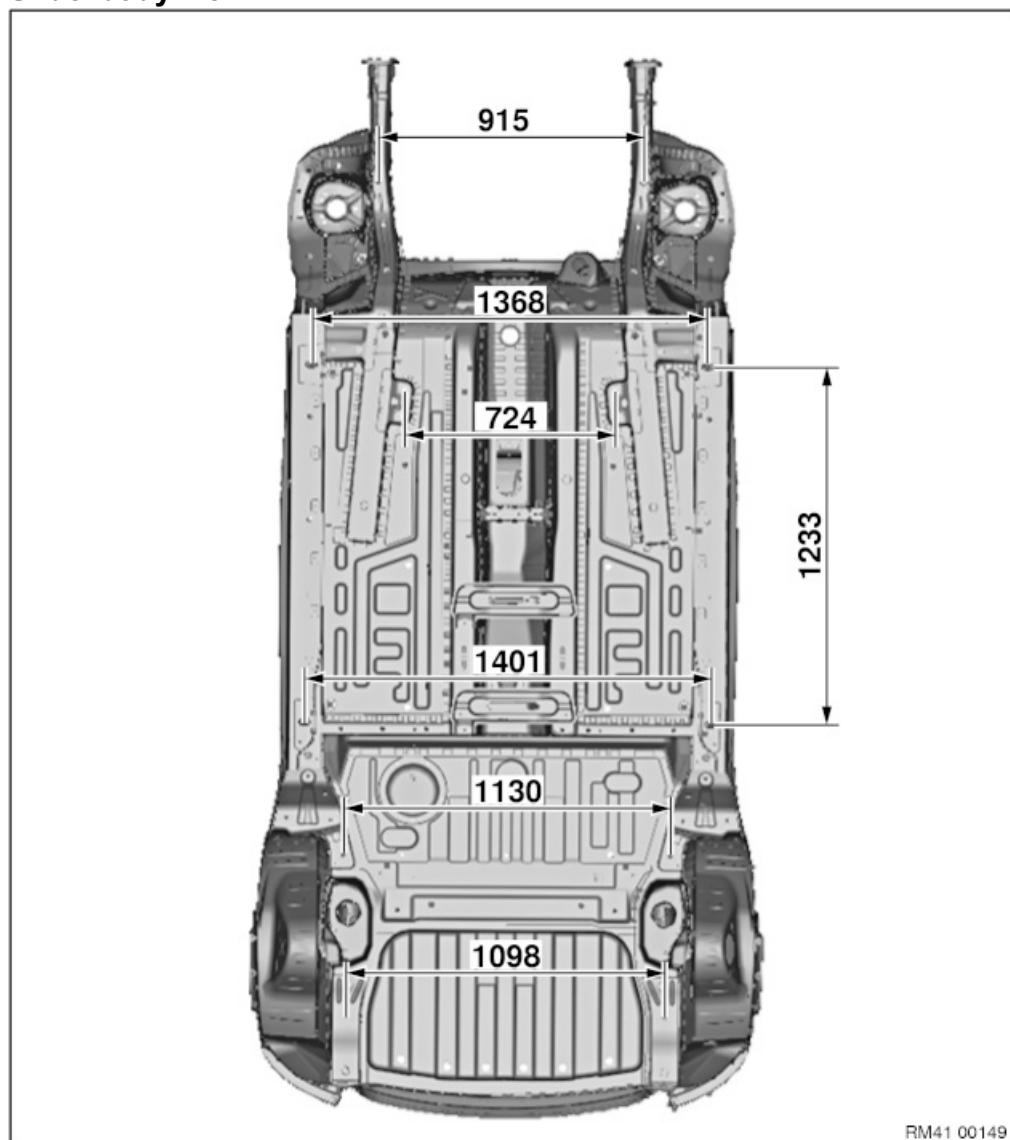
Dimensions in mm.

Dimension tolerances:

- $\leq 1000 \text{ mm} \pm 1.5 \text{ mm}$
- $\geq 1000 \text{ mm} \pm 2.5 \text{ mm}$

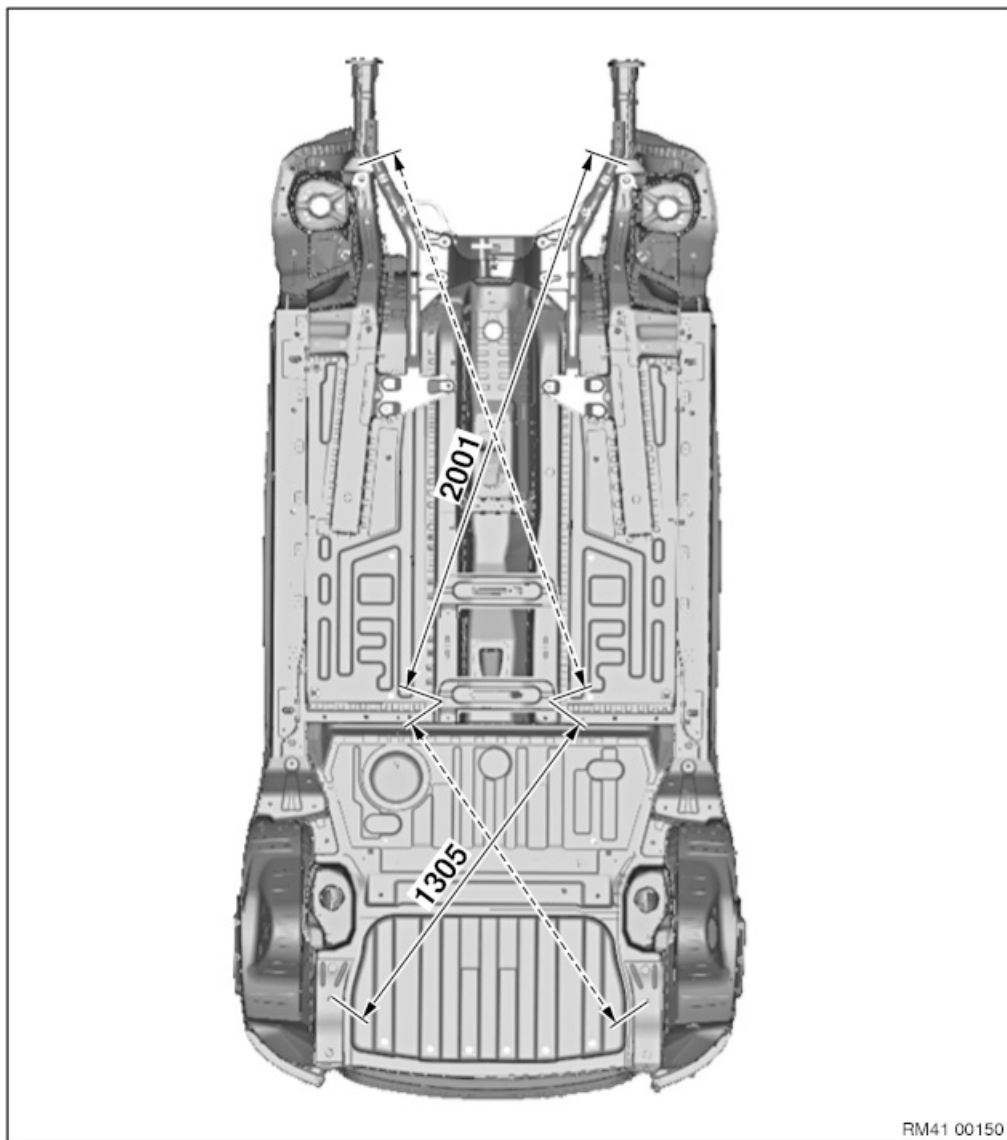
The checkpoints shown serve to check the body and the set of attachments.

Underbody view 1

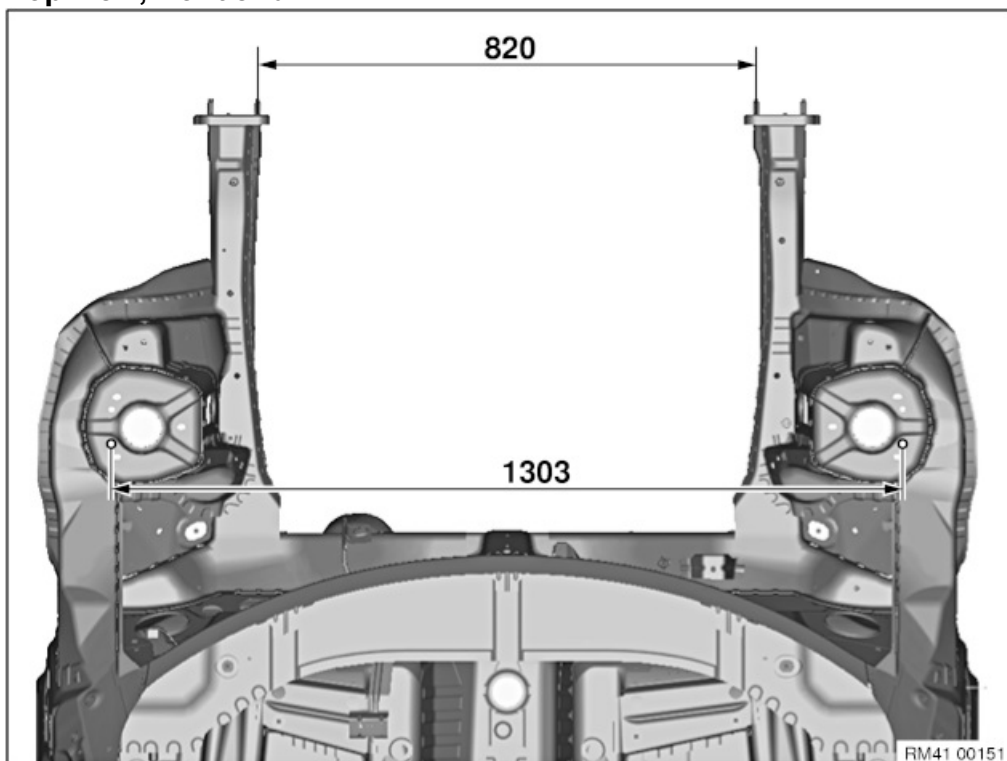


Underbody view 2





Top view, front end





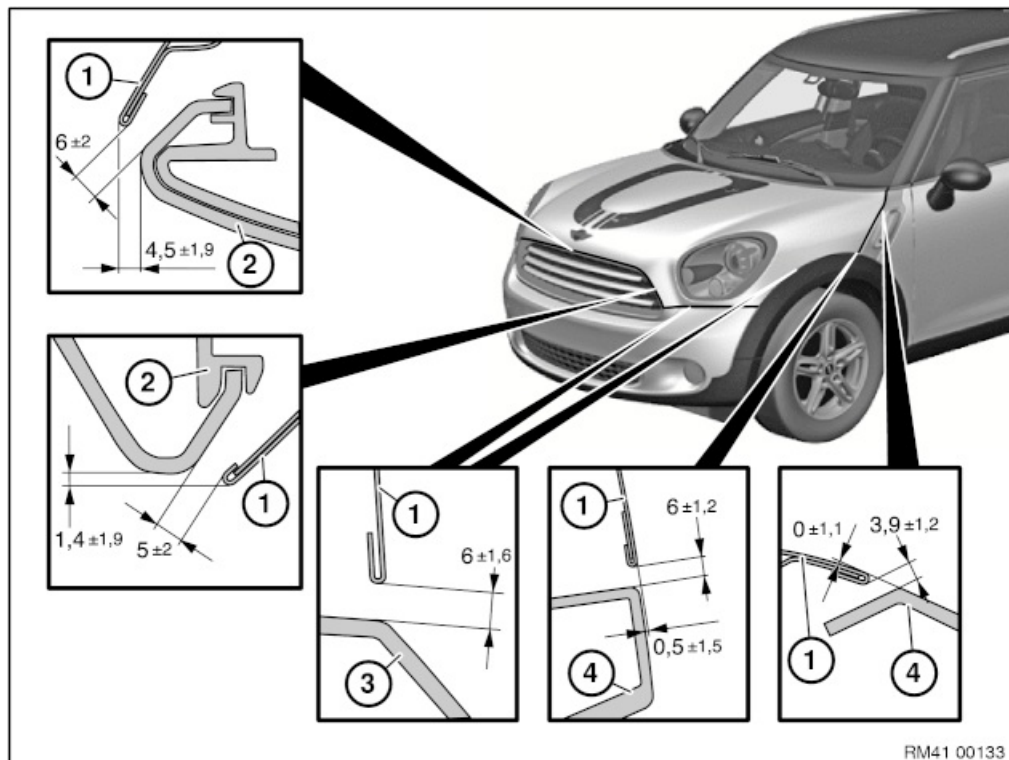
41 00 ... Gap dimensions, body

The dimensions specified in this document are applicable at an object temperature of 20 °C. The aim of adjustment is to achieve a uniform gap.

Symmetry of the gaps between left and right sides of the vehicle has top priority.

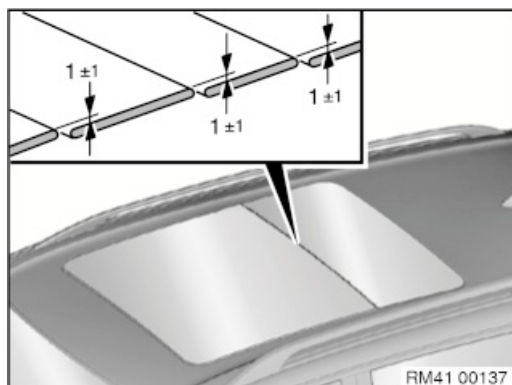
The door gaps must not deviate between the front and rear door gap by more than 1.0 mm.

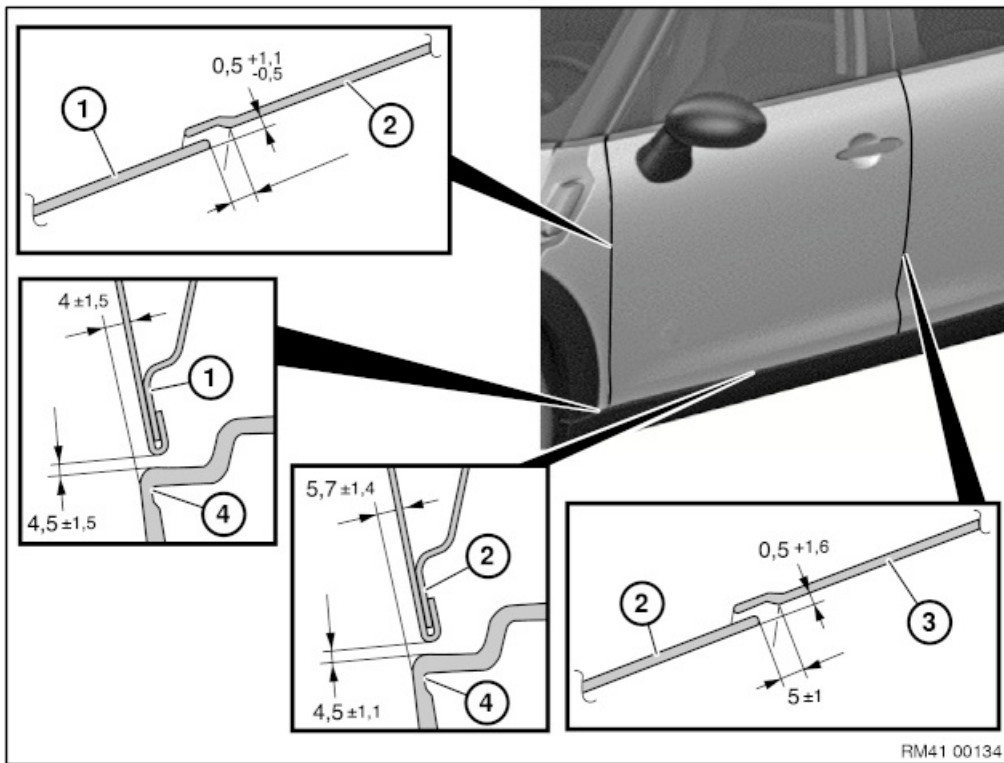
No gap dimension are specified for components which cannot be adjusted.



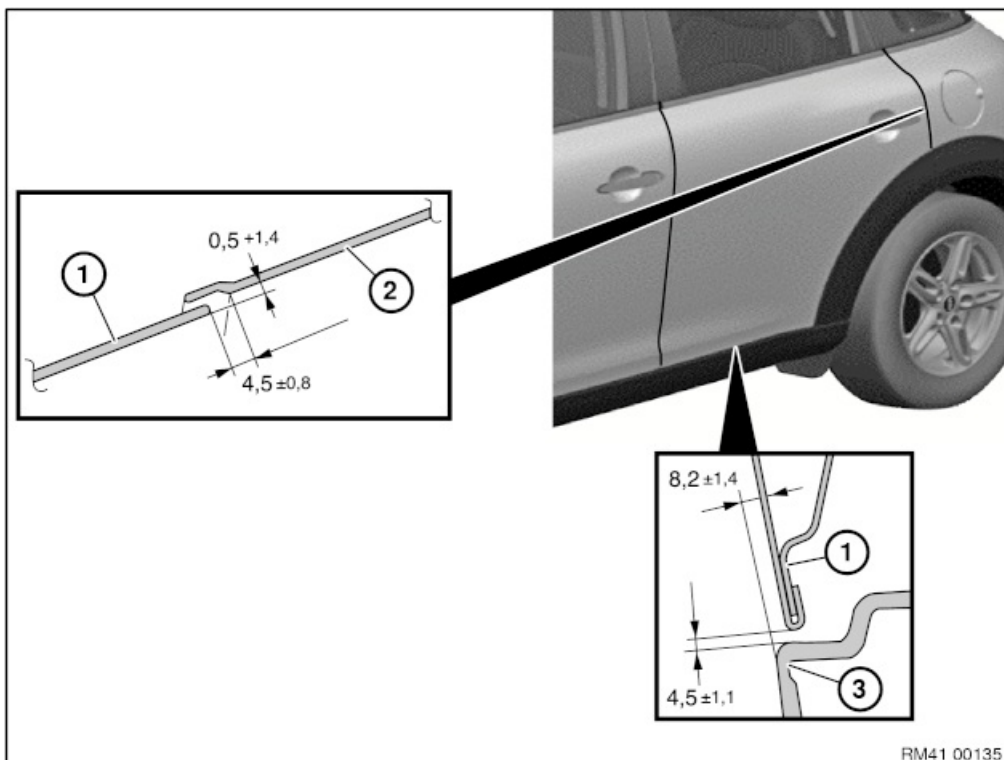
Dimensions in mm

1. Engine compartment lid
2. Front ornamental grille
3. Front bumper trim panel/turn indicator cover
4. Front wheel arch cover



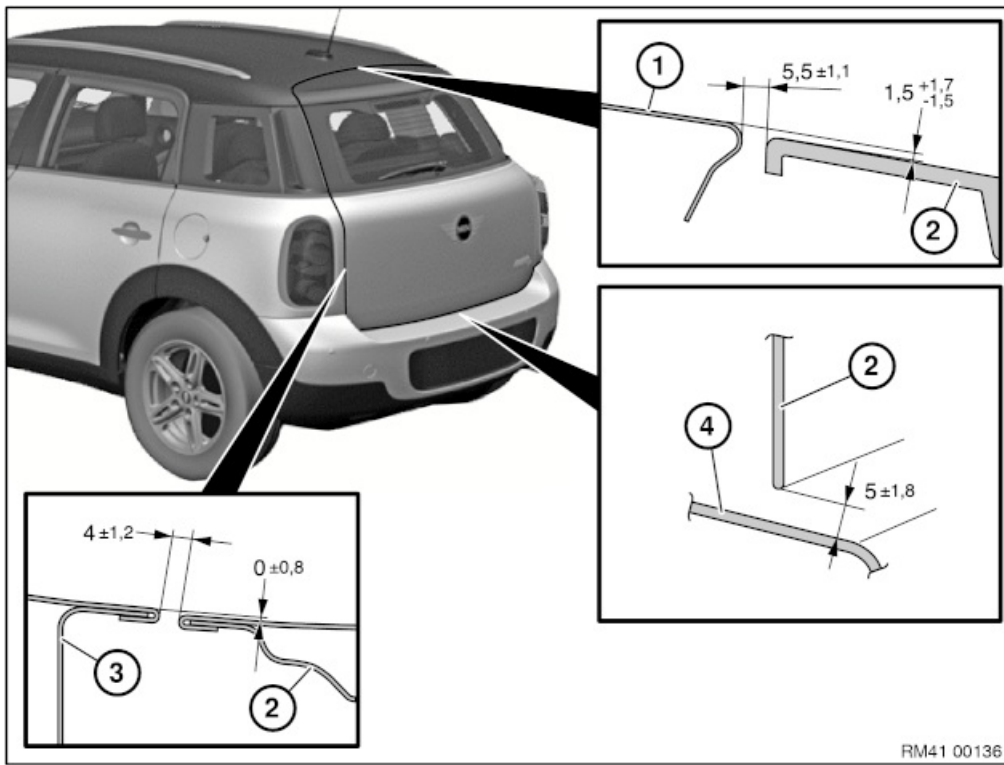


1. Front side panel
2. Front door:
3. Rear door
4. Trim panel for entrance



1. Rear door
2. Rear side walls
3. Trim panel for entrance





1. Roof outer skin
2. Tailgate
3. Rear side walls
4. Trim panel, bumper, rear



99 00 ... **General instructions on paintwork**

General instructions and classification of paint stages are described on the KSD CD (under Notes, General information on flat rate unit data, Passenger car explanation for FRU specifications for paintwork).

The marked area shows the basis of area calculation for creating the flat rate unit. The marked area does not show the area actually to be painted. If touching up is required, the painter defines the precise position as he sees fit.

Special procedure for matte paintwork:

Matte paintwork cannot be touched up since the painted surface cannot be polished.

For further information, see also the BMW painting handbook and the Aftersales Assistance Portal.



51 14 ... General notes for labelling with adhesive films

In the event of a repair the adhesive films must be partially or completely replaced. The basic procedure for all areas of the vehicle is described below.

In addition, vehicle-specific repair instructions are available.

1. Preparation:

Wash and dry vehicle. Rework with compressed air as required in area of joints.

Clean complete component surface with glass cleaner (BMW part number 83 12 0 396 775). Also clean the inside of the component in areas, in which adhesive films are applied.

Only carry out repair work with clean hands!

Important!

Labels can only be applied to recently painted components after a waiting period of **2 weeks**. The paint hardening is only fully completed after this time.

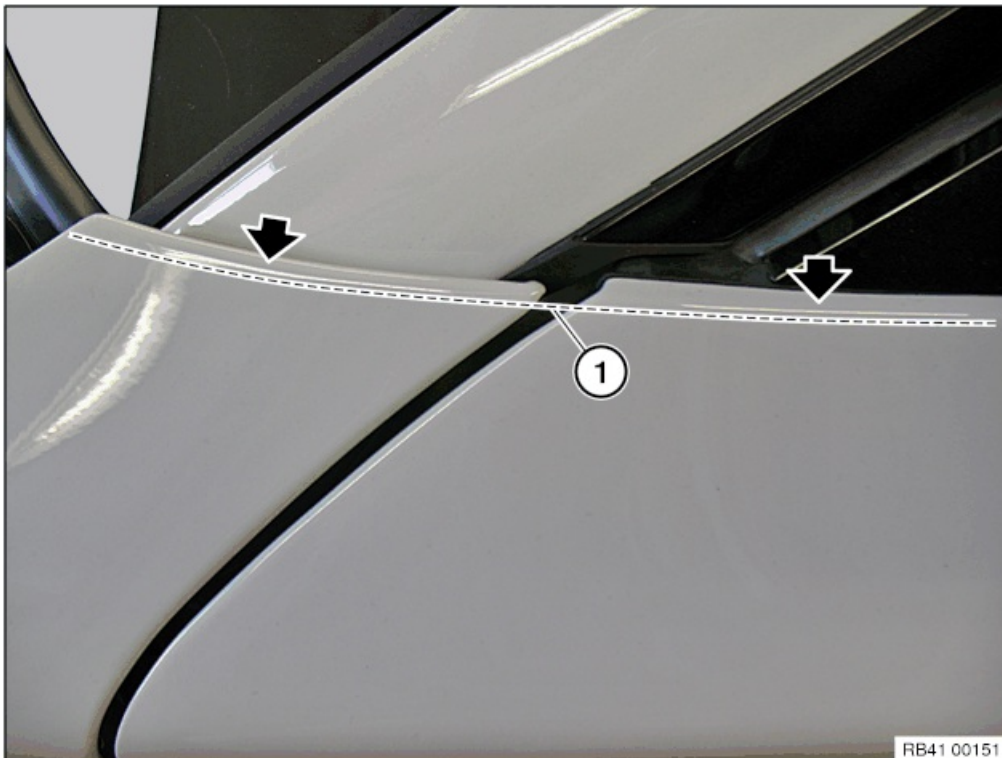
2. Procedure for applying labels:

All adhesive films in the repair kit are marked with numbers. Prepare the required plastic films prior to start of repairs.

The templates included in the repair kit assist orientation. A straight line running over the different components is the top priority.

Pull off the templates positioning of the adhesive films.

Only throw away templates after completion of all repair work, as some templates are used several times.



Templates are always applied along the light edge (1). The light edge is the reflection of the light source in radius (see arrow).

Roughly align the adhesive film using a template.

For large adhesive films, pull off the first 20 cm of protective film and fold back the edge.

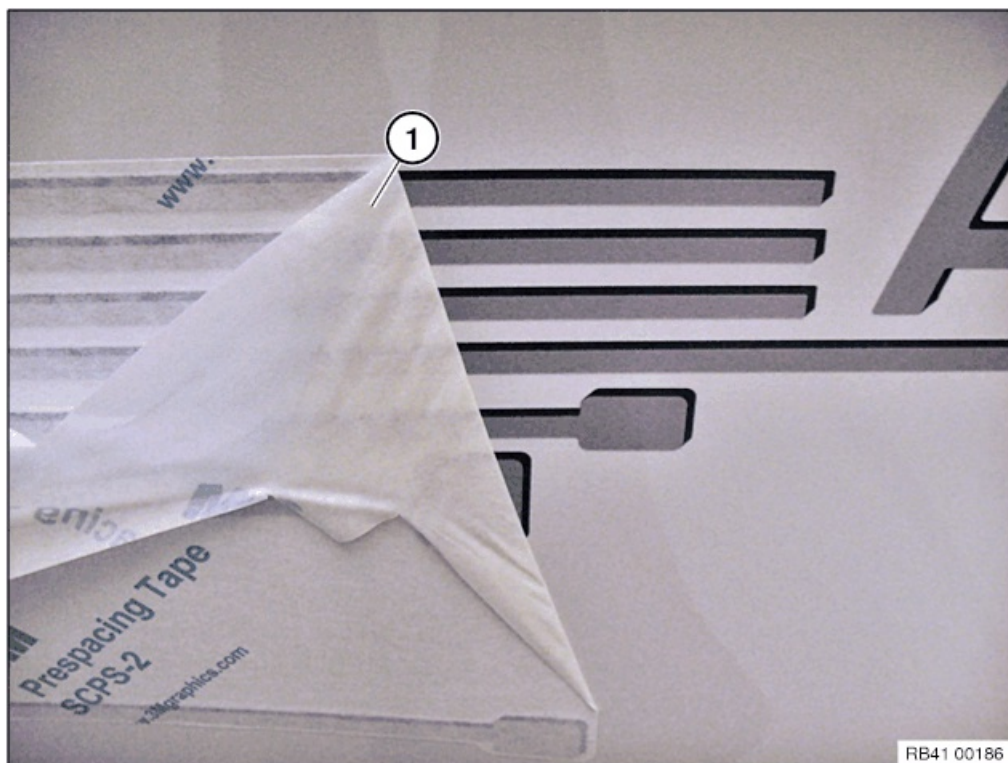
Align and lightly press down the adhesive film. Use only one finger for this and not the entire hand so that air pockets are unable to form under the adhesive film.

Pull off the remaining protective film and press down the adhesive film from front to rear and from inside to outside.



If faults are made in applying the adhesive film, it can be pulled off and repositioned several times. When no further corrections have to be made, use a squeegee to press down the adhesive film firmly from inside to outside.

Lay protruding ends of the adhesive film around the component edge and press down firmly.



Carefully pull off backing film (1) at an acute angle.



41 00 ... Grinding aluminium components

1.0 Recommended tools and equipment

Grinding work on the outer skin:

- To carry out grinding work by hand or machine, you must use the recommended tools and equipment (refer to Service Information 5 03 03 975).
The workbay can be cleaned with conventional extractor systems (low dust concentration).

Grinding work on the structure (except Z8):

- To carry out grinding work by hand or machine, you must use the recommended tools and equipment (refer to Service Information 5 03 03 975).
The workbay can be cleaned with conventional extractor systems (low dust concentration).

Z 8 Spaceframe structure:

- To carry out machine grinding on the structure, you must use the recommended device with grinding dust extractor facility (refer to Service Information 5 01 00 532).
The workbay must be cleaned with the recommended explosion-proof extractor system (refer to Service Information 5 01 00 532).
High dust concentration, **explosion hazard!**

2.0 Grinding outer skin and structure

Do not use any abrasives (grinding wheels, paper, etc.) which contain iron (risk of corrosion).

Always replace abrasives which have already been used to treat steel (risk of corrosion).

Use stainless steel wire brushes only (risk of corrosion).

Reduce speed of grinding machines. Excessive speeds cause a smearing effect.

Do not use coarse abrasive grains (only ≥ 80).

Do not grind notches into the material (risk of cracking).

Do not grind the material thin.



41 00 ... Grinding steel parts

1.0 Recommended tools and equipment

- Tools are recommended for manual grinding work.
- Machines/equipment are recommended for machine grinding work.

See also Aftersales Assistance Portal (ASAP) - Service/Technology - Workshop Equipment (Start BMW) - Shop Workshop Equipment

2.0 Grinding outer shell and structure

Always replace abrasives which have already been used to treat aluminum (risk of corrosion).

Do not grind the material thin.



41 00 ... Handling airbags and restraint systems

1.0 Airbags and restraint systems

- In the case of vehicles with airbags and restraint systems observe the relevant safety instructions.
- When straightening work is carried out on the body there is a risk of airbags being accidentally activated when the battery is connected.
Because of this risk the battery ground cable must be disconnected prior to all repair work on the body.



11 00 ... **Handling components after flood damage**

Flood damage can occur if the permissible fording depth of a vehicle is exceeded. Ingress of water can cause damage to the engine (water shock) or components.

Because dirt particles generally enter into the component with the water (e.g. starter motor, wiring harness), the components need to be thoroughly inspected.

Residual moisture in the components leads to corrosion (increased contact resistance in the component), which can lead to a component failure at a later time.

If water ingress into the electrical components cannot be ruled out, it is recommended to replace the component to ensure correct functioning through the vehicle lifetime.



41 00 ... Handling electrical system and electronics

1.0 Battery

- Explosion hazard in the vicinity of the battery during welding and grinding work. The battery must be removed.

2.0 Control units

- Control units with visible mechanical damages and/or electrical damages caused by accidents must be replaced.
- The following risks exist when the battery is connected:
 - Damage to control units resulting from welding work on the body or a line short circuit.
 - Accidental activation of airbags during straightening work on the body.

Because of these risks the ground cable must be disconnected prior to all repair work.

- Control units are designed for a temperature of 65 °C. The temperatures in a spray booth do not pose any problems. If a vehicle is in the spray booth at a displayed temperature of 80°C, the actual temperature of the vehicle is ≤ 60 °C (object temperature).
- Protect control units against the influence of heat >65 °C (e.g. during welding and drying work with infrared beams or hot air blowers).

3.0 Electrical wires and wiring harnesses

- Protect electrical wires and wiring harnesses against damage (e.g. during straightening and grinding work).
- Protect electrical wiring and wiring harnesses against the influence of heat >65 °C (e.g. during welding and drying work with infrared beams or hot air blowers).
- Do not kink electrical wiring.

4.0 Optical fibres

- Follow instructions for handling optical fibres.



41 00 ... Information on hazards

1. Aluminium

Hazards/effects	Measures / regulations
Repair stage 1 and 2: No hazards/effects	none
Repair stage 3: (Welding - only E52) <ul style="list-style-type: none">Explosion hazard due to high concentration of fine aluminium dust. Arising e.g. during straight-through grinding of coated components in the base material and large-surface grinding of bright-finish components.Explosion hazard due to swirling up of fine aluminium dust in cavities. Created by the necessary, thorough cleaning of machining surfaces and tools before and after machining aluminium.	<ul style="list-style-type: none">Avoid high concentration of fine aluminium dust by means of continuous extraction.Use explosion-proof exhaust extraction unitDo not use compressed air when cleaning the workbay.Avoid swirling up dust when cleaning the workbay.
<ul style="list-style-type: none">Spontaneous combustion of fine aluminium dust when ignition and fire sources are drawn in. E.g.: hot swarf, grinding sparks, cigarettes, etc.	<ul style="list-style-type: none">Do not operate ignition and fire sources in the intake area of exhaust extraction unit.

2. Carbon

Hazards / effects	Measures / regulations
Repair stage 1: No hazards/effects	none
Repair stage 2 and 3: <ul style="list-style-type: none">Explosion hazard due to high concentration of carbon dust. Produced when grinding carbon.Explosion hazard due to swirling up of carbon dust in cavities. Created by the necessary, thorough cleaning of machining surfaces and tools before and after machining carbon.	<ul style="list-style-type: none">Avoid high concentration of carbon dust by drawing it off continuously.Use explosion-proof exhaust extraction unitDo not use compressed air when cleaning the workbay.Avoid swirling up dust when cleaning the workbay.
<ul style="list-style-type: none">Spontaneous combustion of carbon dust when ignition and fire sources are drawn in. E.g.: hot swarf, grinding sparks, cigarettes, etc.	<ul style="list-style-type: none">Do not operate ignition and fire sources in the intake area of exhaust extraction unit.



41 00 ... Information on metal filler

Note:

The metal spatula is omitted.

Changes to the procedure are described here.



64 00 ... Information on using cleaning agent/paints (personal protection equipment)



Warning!

Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!

Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!



Important!

Observe following instructions:

- Store cleaning agents/paints only in a secure cabinet.
- Keep cleaning agents/paints away from naked flames and other sources of ignition.
- Protect cleaning agents/paints from high temperatures and direct sunlight.
- Always keep an eye douche on hand, change the water regularly (once a month).



Important!

Observe following instructions before use:

- Manufacturer's instructions (on container/packaging)
- Hazard warnings (on container/packaging)
- Manufacturer's instructions on package insert
- Material safety data sheet of manufacturer
- Product information in EPC
- National market regulations



Important!

Observe following instructions during use:

- Do not eat, drink or smoke while working with these products.
- Avoid direct contact with skin and eyes.
- Wear personal protective clothing/equipment.
- Ensure that all enclosed areas are well ventilated or extract fumes directly.
- Immediately change working clothes soiled with cleaning agent/paint.
- After finishing work, wash your hands and apply protective skin cream.



Important!

Follow hazard warnings and wear personal protection equipment!





First Aid:

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapours ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.



Recycling:

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.



41 00 ... Information on vehicle protection

- Vehicle parts located in the repair zone or threatened by heat, sparks or dust, must be removed or covered. For suitable covering material, see Service Information.

Important!

Do not use flammable or dirty material for covering.



41 00 ... Information/warning labels

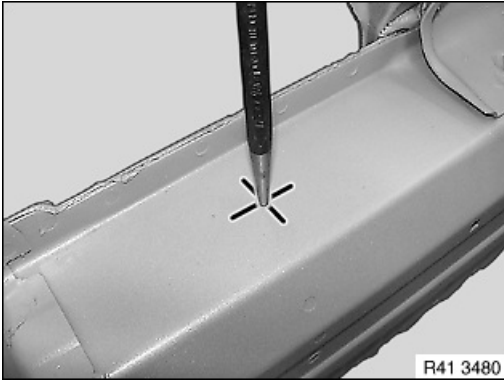
Missing or damaged labels (e. g. tyre pressure) must be replaced.

--> overview via the installation location



**Protection measures!**

- Wear safety goggles
- Wear protective gloves

**Hexagon/straight shank rivet nut (up to thread 8) with hand rivet gun ZS308 Important!**

Risk of damage!

Failure to comply with these instructions may result in the drill bit slipping and causing significant paintwork damage.

1. Mark position of bore and then punch-mark component

**Important!**

If the determined drill bit diameter is not observed:

- the knurling on the straight shank rivet nut is rendered useless
- the component will be damaged when the straight shank rivet nut is inserted

Determining suitable drill bit:

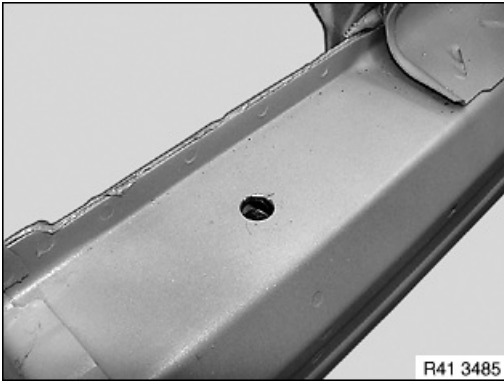
Depending on the rivet nut shank diameter, the next drill bit diameter higher (5/10 step) can be used.

E.g. with a shank diameter of 10.1 mm, the 10.5 mm drill bit can be used. The 11.0 mm drill bit must not be used.



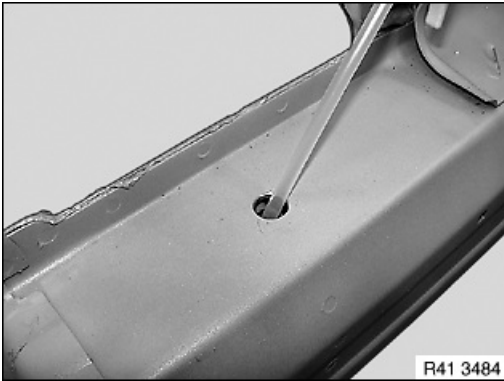
2. Drill bore with determined drill bit and deburr, pilot-drill with a smaller drill bit if necessary





R41 3485

3. Clean component, eliminate paintwork damage if necessary

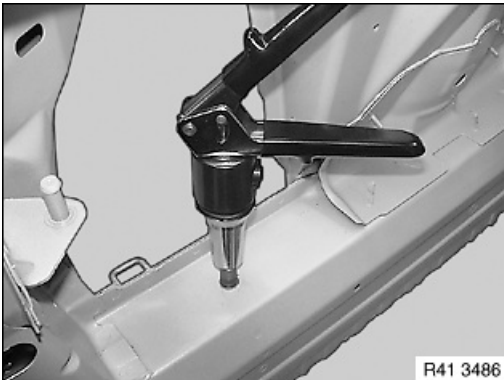


R41 3484

Important!

To avoid corrosion, stop chips/swarf by means of cavity sealing.
Follow instructions on corrosion protection .

4. Preserving cavity



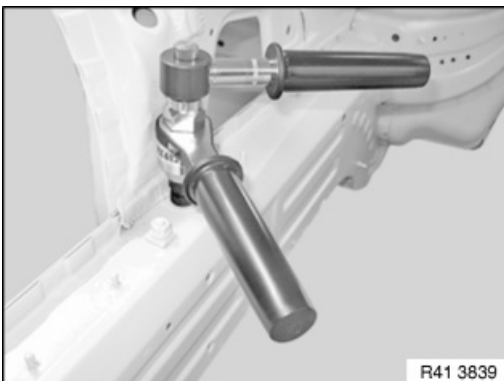
R41 3486

Important!

Follow manufacturer's operating instructions.
Make sure straight shank rivet nut correctly contacts component.

5Set rivet nut with hand rivet gun/Note:

According to the manufacturer, the pictured tool is suitable up to an M8 thread (see Aftersales Assistance Portal (ASAP) - Service/Technology - Workshop Equipment (Start BMW) - Workshop Equipment Shop or www.bmwgroup-wep.com).



R41 3839

Hexagon / straight shank rivet nut (up to thread M12) with hand rivet gun MB512

Important!

Follow manufacturer's operating instructions.
Make sure hexagon rivet nut correctly contacts component.

Set rivet nut with hand rivet gun

Note:

According to the manufacturer, the pictured tool is suitable up to an M12 thread (see Aftersales Assistance Portal (ASAP) - Service/Technology - Workshop Equipment (Start BMW) - Workshop Equipment Shop or www.bmwgroup-wep.com).



41 00 ... Installing a cavity sealing with 2-component PU cavity foam

Sourcing reference for cavity foam HS1 (refer to BMW Parts Department).

Important!

The cavity foam may only be used for cavity sealing at the points at which cavity sealing is present as standard!

The following repair represents the replacement of a shaped part for the cavity sealing by the use of cavity foam.

This type of cavity sealing is used at points at which shaped parts cannot be used for repairs.

This is the case when large amounts of heat occur (e.g. due to welding, soldering or tin-plating) in the direct vicinity or at the point of the standard cavity sealing.

It is not possible here to install shaped parts for the cavity sealing because of the fire risk!

To replace shaped parts with cavity foam at further locations, adopt the procedure shown here and adapt it to the relevant ratios.

It must be ensured that the cavity sealing is fully completed.

Note:

Check the accessibility for the spraying pipe of the cavity foam to the affected cavity after removing the defective parts.

Properties of cavity foam HS1:

- 2-component PU foam, solvent-free.
- Excellent flow capacity, enabling complete sealing of cavities.
- Good strength, preventing slipping in cavities.
- Low water absorption, preventing corrosion.
- Ideal for use as insulating and sealing compound.

Information on dangers/hazards:

- Avoid eye and skin contact.
Wear eye protection, solvent-resistant protective gloves and protective clothing.
- Do not inhale.
Apply in well ventilated rooms only.
- **Warning!**
Application time after mixing process: within **8 minutes!**
Completely empty open can after use.
- Residual amounts which are not used can cause the can to explode on account of a chemical reaction (buildup of heat)!
Alternatively, cool the can containing the non-removed residual amount for several hours in cold water.
- Do not eat, drink or smoke while working with these products.
- Keep heat and ignition sources far away.
- Read the manufacturer's information on hazards/dangers (printed on the can) prior to application.

Processing instructions:

- Observe the expiry date on the cartridge.
Do not use spray can after the expiry date has passed. After the Use by date the properties of the cavity foam will no longer meet the requirements of the BMW Group.
- Cavity preservation of the repair area possible after an air drying time of 1 hour.
- Surface must be **clean, free of dust, grease, oil and separating agents**.
- Application temperature at least 15 °C. Optimally 20 °C.
- Important!



Foam expands many times over as it sets (change in volume).

- Before applying to the vehicle, fill a clearly visible cavity of corresponding size with foam on a used part. This enables an optimal dosage (i.e. spraying time) to be specified for filling the cavity on the vehicle with foam.
- Tape off open passages to visible areas with adhesive tape to prevent foam from escaping.
- The setting takes approx. 30 minutes. Mechanical processing (e.g. drilling, cutting, etc.) is then possible
- Cavity preservation of the repair area possible after an air drying time of 1 hour.
- Remove fresh, non-hardened polyurethane foam with adhesive remover 208.
Sourcing reference: BMW Parts Department.
Hardened polyurethane foam can only be removed mechanically.
- Excess hardened polyurethane foam can be disposed of as residual waste.
Cans that are not entirely empty or are unused and have an expired expiry date are classed as hazardous waste.
Observe country-specific waste disposal regulations.
- Observe the manufacturer's processing instructions (printed on the can).



41 00 ... Installing a cavity sealing with 2-component PU cavity foam

Sourcing reference for cavity foam HS3 (refer to BMW Group Parts).

Attention!

The cavity foam may only be used for cavity sealing at the points at which cavity sealing is present as standard!

The following repair represents the replacement of a shaped part for the cavity sealing by the use of cavity foam.

This type of cavity sealing is used at points at which shaped parts cannot be used for repairs.

This is the case when large amounts of heat occur (e.g. due to welding, soldering or tin-plating) in the direct vicinity or at the point of the standard cavity sealing.

It is not possible here to install shaped parts for the cavity sealing because of the fire risk!

To replace shaped parts with cavity foam at further locations, adopt the procedure shown here and adapt it to the relevant ratios.

It must be ensured that the cavity sealing is fully completed.

Note:

Check the accessibility for the spraying pipe of the cavity foam to the affected cavity after removing the defective parts.

Properties of cavity foam HS3:

- 2-component PU foam, solvent-free.
- Excellent flow capacity, enabling complete sealing of cavities.
- Low water absorption, preventing corrosion.
- Ideal for use as insulating and sealing compound.

Information on dangers/hazards:

- Avoid eye and skin contact.
Wear eye protection, solvent-resistant protective gloves and protective clothing.
- Do not inhale.
Apply in well ventilated rooms only.
- **Warning!**
Processing after the mixing process within a few seconds!
- Do not eat, drink or smoke while working with these products.
- Keep heat and ignition sources far away.
- Observe the manufacturer's information on dangers / hazards prior to application (imprint on double cartridge).

Processing instructions:

- Observe the expiry date on the cartridge.
Do not use cavity foam after the expiry date has passed. After the Use by date the properties of the cavity foam will no longer meet the requirements of the BMW Group.
- Cavity preservation of the repair area possible after an air drying time of 1 hour.
- Surface must be **clean, free of dust, grease, oil and separating agents**.
- Application temperature at least 15 °C. Optimally 20 °C.
- Attention!
Foam expands during hardening (volume change).
- Tape off open passages to visible areas with adhesive tape to prevent foam from escaping.
- The setting takes approx. 30 minutes. Mechanical processing (e.g. drilling, cutting, etc.) is then possible



- Cavity preservation of the repair area possible after an air drying time of 1 hour.
- Remove fresh, non-hardened polyurethane foam with adhesive remover 208.
Sourcing reference, see BMW Group Parts.
Hardened polyurethane foam can only be removed mechanically.
- Excess hardened polyurethane foam can be disposed of as residual waste.
Double cartridges that are not entirely empty or are unused and have an expired expiry date are classified as hazardous waste.
Observe country-specific waste disposal regulations.
- Observe the manufacturer's processing instructions (imprinted on double cartridge).



41 00 ... Installing cavity sealing (expanded)



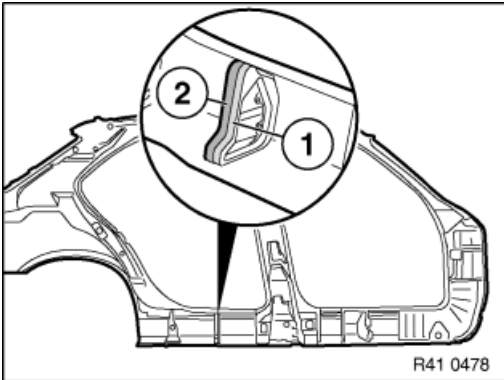
Note:

Carry over schematic diagram to the relevant vehicle type.

The following repair represents the procedure for an already expanded cavity acoustic baffle.

The cavity acoustic baffle remains on the body in this instance.

Before these work steps, prepare the new part so that it is ready to install (adapting, cutting to size, applying welding primer etc.).



Clean contact surface (1) with cleaning agent R2.

Apply a bead (2) approx. 15 mm high of sealant D2 to contact surface (1).

If necessary apply sealant D2 somewhat thinner on each side, to prevent the sealant from running.

Fit, secure and weld up new part.



Warning:

Ensure adequate ventilation over entire processing period.



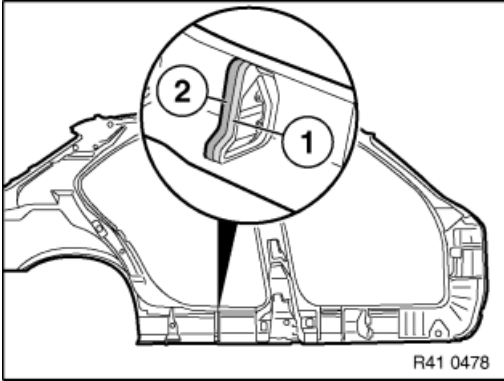
41 00 ... Installing cavity sealing (not expanded)



Note:

Carry over schematic diagram to the relevant vehicle type.

The following repair represents replacement of a cavity acoustic baffle. Before these work steps, prepare the new part so that it is ready to install (adapting, cutting to size, applying welding primer etc.).



Sand contact surface of cavity acoustic baffle (1) with coarse-grained sandpaper (grain 50-100).

Clean contact surface (1) with cleaning agent R2.

Apply a bead approx. 15 mm high of sealant D2 to contact surface (1).

If necessary apply sealant D2 somewhat thinner on each side, to prevent the sealant from running.

Attach cavity acoustic baffle in specified position (see old part).

Fit, secure and weld up new part.



Warning:

Ensure adequate ventilation over entire processing period.



41 00 ... Materials science

1. Aluminium

1.1 Chassis/suspension components

Read and observe the Notes on chassis/suspension components before handling aluminium.

1.2 Material influences

Causes	Effects / remedies
A galvanic element is created under the effects of moisture by contact with materials such as copper, tin, nickel, iron and zinc.	<p>This plating process causes aluminium to be removed from the connection point.</p> <p>This results in surface corrosion or pitting.</p> <p>New parts and accessory parts which have been approved by the BMW Group for aluminium (screws, washers, nuts etc.) have undergone special surface treatment.</p> <p>Such parts must not be replaced by conventional parts.</p> <p><i>Note:</i></p> <p>Damaged parts lose this protection and must be specially coated or replaced.</p> <p>Damage caused by contact corrosion is excluded from the warranty.</p>
Tools also used for work on steel components can implant steel particles in the softer surface of an aluminium component.	<p>Surface corrosion or pitting occurs.</p> <p>A separate tool set is available for processing/machining aluminium.</p>
Surfaces are attacked when fluxing agents are used.	<p>Soldering is not permitted for joining aluminium components.</p> <p>Risk of corrosion from chemical factors.</p>
Aluminium/steel grinding dust from adjoining working areas.	<p>This results in surface corrosion.</p> <p>Erection of protective barriers.</p>

1.3 Machining properties

Properties of aluminium compared with steel	Effects
Aluminium parts are magnetically neutral.	Attachment with magnetic tools/working aids is not possible.
Elasticity is only 1/3 as high.	Convertibility is limited in comparison with steel.
Elongation failure is approx. 50 % slighter.	Overstretching the material results in strain-hardening and an increased tendency of cracking.



Electrical conductivity is almost 4 times higher.	Electric welding methods require different equipment (MIG welding).
Material expansion during heating is twice as high.	The material expands more markedly. Shorter heat treatment is necessary for removing dents.
Thermal conductivity is 3 times higher.	Heat is drained more quickly. Adjoining working areas are affected more heavily e.g. during welding.
Structural transformation between 200 °C and 250 °C	<p>Elongation characteristics and thus plasticity are improved.</p> <p>Strength is reduced.</p> <p>Important!</p> <p>No heat treatment during repair work on the vehicle structure! Workshop operation doesn't make it possible to control the temperature to sufficiently exact levels.</p>
Aluminium shows no annealing colours.	<p>The melting point is 650 °C. Once the melting temperature has been reached, the material begins to flow without any further indications.</p> <p>The temperature can only be estimated by means of the paint colouring and the surface warpage.</p> <p>Important!</p> <p>Do not use thermo crayons. Not suitable for workshop operation because the paint runs too quickly.</p>

1.4 Storage

Characteristic features of aluminium	Special measures
Corrosion (ageing) in damp environments.	Store aluminium components in a dry place.
Contact corrosion in event of contact e.g. with steel components.	Always store aluminium components separately or in isolation from steel components.
Susceptibility to paint infiltration.	<p>Do not damage factory protective layer of the surface since this would cause oxidation.</p> <p>Failure to comply with this requirement would result in more painting work.</p>



32 00 ... Notes and specifications for the replacement of the steering gear, steering column and the steering shaft following accident damage

Situation:

In the event of accidents or driving conditions similar to accidents, shock-like loads can cause different types of damage to steering boxes. When a steering box is externally undamaged, it is sometimes only possible to identify damage with great difficulty and with great effort. However, damage of this nature poses an unacceptable risk to the vehicle because it can result in failure of the steering system.

Because of the disproportionate amount of effort involved, it is generally not sensible to check thoroughly all the individual components of the steering box and as an alternative it is necessary to take into account other components which can be checked more easily.

Procedure:

The steering box must be replaced if one or more of the following points apply:

- A. Visible or noticeable damage to the steering box
 - Version with electric steering box (EPS): Examine in particular the control unit with all plug connections for damage and hairline cracks.
- B. Unacceptable torque increase and jamming when the steering box is turned from lock to lock (without hydraulic/electrical assistance)
- C. Fire damage
- D. Damage, permanent deformation or fractures to:
 - Wheel rims in the event of a negative result from the wheel alignment check
 - Spring struts, steering stubs, wheel carriers
 - Wishbones
 - Struts or trailing links or anti-roll bar with this function
 - Body-side attachment points for wheel guide/control components
 - Front axle support
 - Pitman arms
 - Track rods
 - Steering box fixtures
 - Steering column

A lopsided steering wheel, significant deviations of camber/track values and noises when cranking the steering can be additional indications for the damage/deformations listed here.

This guideline is binding for all accident repairs to BMW and MINI vehicles.

Note:

If the steering box replacement work which is required for safety reasons is refused by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

For a corresponding example of the memorandum, see Service Information (bulletin) 320188(828) Appendix 1.

Actual situation of the steering column and steering shaft:

In the event of accidents or driving conditions similar to accidents, shock-like loads can cause different types of damage to the steering shaft and steering column. In case no external damage of the steering column and the steering shaft can be noticed, it is sometimes only possible to identify damage with great difficulty and with great effort.

Procedure for steering column and steering shaft:

The steering column and steering shaft must be replaced if one or more of the following points apply:

- Visible or noticeable damage, deformation or breakage of the steering column or steering shaft
- Damage, permanent deformation or breakage of the track rod



- Unacceptable torque increase and jamming when the steering column is cranked from limit position to limit position (without hydraulic/electrical assistance)
- If the wheel alignment nominal data cannot be reached after all the damaged wheel components are changed (exceedance of the permissible wheel alignment tolerances). If required, attach the measurement protocol of the invoice/certificate
- Positive check for activated crash system of the steering column:
- If no damage is visible on the steering column, the mechanical steering column must be checked for an activated crash system:
 1. Open ELV
 2. Pull steering wheel out towards the driver (towards the body) until the physical limit position is reached, but do not use excessive force
 3. Push steering wheel towards engine compartment (approx. 20-30 mm away from body) into the comfort position and lock

If no end stop is present when pulling out the steering column or the gaiter of the steering column shroud has tension, the crash system has activated and the steering column is to be renewed.

Note:

If the steering column/steering shaft replacement work which is required for safety reasons is rejected by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

For corresponding specimen of the memorandum, refer to Service Information 320188(828) Appendix 1

Attention!

The vehicle's operating licence will be invalidated whenever the function of any of its safety components is compromised!



41 00 ... Notes on adhesive K1

Important!

Note the following information before starting to apply adhesive!

- Country-specific safety and industrial safety regulations
- Material safety data sheet of manufacturer
- Processing instructions on glue cartridge

Storage:

Dry at 15° - 25 °C.

Shelf life:

The glue cartridge is marked with a date.

Do not use the adhesive after this date.

Surface pre-treatment:

The pre-treatment depends on the material to be bonded and its coating.

Required cartridge gun:

Overview of glue cartridge guns

Do not use compressed-air-operated cartridge guns!

Preparing the glue cartridge:

Opened glue cartridges may be used again before the expiry date as long as a new mixing tube is used.

The working temperature of glue cartridge must be at least 20°C.

Insert glue cartridge into cartridge gun, remove cap and allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube. Only use mixing tubes supplied with glue cartridge. Allow approx. 10 cm of mixed adhesive to emerge.

Only after this apply the mixed adhesive to one side of the bonding surface.

Application time of mixed adhesive approx. 2 hours. A change of mixer is only necessary if over a period of 1 hour no material has flowed through the mixer.

2-component adhesive application:

Read the vehicle-specific repair instructions to determine the thickness and positioning of the adhesive bead.

After applying the adhesive, check whether an adhesive component has emerged at the back of the glue cartridge. If yes, break off the bonding procedure. Clean new part. Use new glue cartridge. Contact national hotline.

Remove contamination caused by adhesive residue immediately.

Hardened adhesive can only be removed mechanically.

Hardening time:

Do not move the vehicle before the adhesive has hardened.

Check the degree of hardness of the adhesive with a fingernail.

If the adhesive cannot be pressed in any further with a fingernail, the vehicle may be moved (without engine force) for further processing applications (e.g. painting).

Vehicle **strength for driving applications** is achieved after:



48 hours at an object temperature of 15°C.

10 hours at an object temperature of 23°C.

1 hour at an object temperature of 60°C.

0.5 hours at an object temperature of 85°C.

Important!

When using radiant heaters, make sure that the object temperature does not exceed 85 °C.
Excessively high temperatures will destroy the adhesive.

Disposal of adhesive:

Hardened adhesive is disposed of as normal waste.

Empty glue cartridges are disposed of as normal waste.

Non-hardened adhesives and a mixture of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.



41 00 ... Notes on adhesive K2

Important!

Note the following information before starting to apply adhesive!

- Country-specific safety and industrial safety regulations
- Material safety data sheet of manufacturer
- Processing instructions on glue cartridge

Storage:

Dry, at 15 °C - 25 °C.

Shelf life:

The glue cartridge is marked with a date.

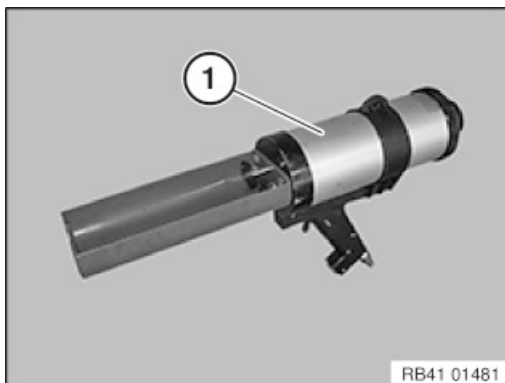
Do not use the adhesive after this date.

Surface pre-treatment:

Refer to vehicle-specific repair instructions or Notes.

Required cartridge gun:

Cartridge gun 81 49 2 355 475 for 2x290 ml container



Preparation of the glue cartridge (2x290 ml):

Opened glue cartridges may be used again before the expiry date as long as a new mixing tube is used.

The working temperature of glue cartridge must be at least 20°C.

Application time of adhesive at 28 °C 35 min and at 18 °C 50 min

Remove the sealing cap on the back of the glue cartridge. Remove the safety and connecting pipe. Puncture the glue cartridges open. Attach the connecting pipe and insert the glue cartridge in the cartridge gun. Allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube. Only use mixing tubes supplied with glue cartridge. Allow approx. 10 cm of mixed adhesive to emerge.

Only after this apply the mixed adhesive to one side of the bonding surface.

2-component adhesive application:

Read the vehicle-specific repair instructions to determine the thickness and positioning of the adhesive bead.

After applying the adhesive, check whether an adhesive component has emerged at the back of the glue cartridge. If yes, break off the bonding procedure. Clean new part. Use new glue cartridge. Contact national hotline.

Remove contamination caused by adhesive residue immediately.



Hardened adhesive can only be removed mechanically.

Hardening time:

Do not move the vehicle before the adhesive has hardened.

The following hardening times apply unless the specifications in the vehicle-specific repair instructions indicate otherwise:

Adhesive K2 (2x290 ml):

Important!

During the initial 12 hours, no accelerated hardening with a heat gun or heat chamber is permitted!

The **solidity for installation work** on the vehicle is reached after:

12 hours at an object temperature of 18°C.

Vehicle **strength for driving applications** is achieved after:

48 hours at an object temperature of 18°C.

Important!

When a complete side frame is replaced (without partial replacement), the hardening period will increase to 24 hours until the beginning of installation work.

Disposal of adhesive:

Hardened adhesive is disposed of as normal waste.

Empty glue cartridges are disposed of as normal waste.

Non-hardened adhesives and mixtures of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.



41 00 ... Notes on adhesive K3

Important!

Note the following information before starting to apply adhesive!

- Country-specific safety and industrial safety regulations
- Material safety data sheet of manufacturer
- Processing instructions on glue cartridge

Storage:

Dry at 15°- 25 °C.

Shelf life:

The glue cartridge is marked with a date.

Do not use the adhesive after this date.

Surface pre-treatment:

See vehicle-specific repair instructions

Required cartridge gun:

Overview of glue cartridge guns

Preparing the glue cartridge:

Do not prepare the glue cartridge until just before applying the adhesive.

The working temperature of glue cartridge must be at least 18°C.

Pot life of adhesive is approx. 10 minutes at 25 °C.

Insert glue cartridge into cartridge gun, remove cap and allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube. Only use mixing tubes supplied with glue cartridge.

Before starting to apply adhesive, allow approx. 1 mixing tube length of mixed adhesive to emerge. Only then apply the mixed adhesive to one side of the bonding surface.

Opened cartridges may be used again before the expiry date as long as a new mixing tube is used.

2-component adhesive application:

Read the vehicle-specific repair instructions to determine the thickness and positioning of the adhesive bead.

Hardening time:

See vehicle-specific repair instructions

Adhesive disposal:

Hardened adhesive is disposed of as normal waste.

Empty glue cartridges are disposed of as normal waste.

Non-hardened adhesives and mixtures of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.



41 00 ... Notes on adhesive K4

Important!

Note the following information before starting to apply adhesive!

- Country-specific safety and industrial safety regulations
- Material safety data sheet of manufacturer
- Processing instructions on glue cartridge

Storage:

Dry at 15°- 25 °C.

Shelf life:

The glue cartridge is marked with a date.

Do not use the adhesive after this date.

Surface pre-treatment:

See vehicle-specific repair instructions

Required cartridge gun:

Overview of glue cartridge guns

Preparing the glue cartridge:

Do not prepare the glue cartridge until just before applying the adhesive.

Opened glue cartridges may be used again before the expiry date as long as a new mixing tube is used.

The working temperature of glue cartridge must be at least 18°C.

Working life of adhesive is approx. 10 minutes.

Insert glue cartridge into cartridge gun, remove cap and allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube. Only use mixing tubes supplied with glue cartridge.

Before starting to apply adhesive, allow approx. one half mixing tube length of mixed adhesive to emerge. Only then apply the mixed adhesive to one side of the bonding surface.

2-component adhesive application:

Read the vehicle-specific repair instructions to determine the thickness and positioning of the adhesive bead.

Hardening time:

The bonded connection will be resistant after 30 minutes.

Disposal of adhesive:

Hardened adhesive is disposed of as normal waste.

Empty glue cartridges are disposed of as normal waste.

Non-hardened adhesives and mixtures of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.



41 00 ... Notes on adhesive K5

Important!

Note the following information before starting to apply adhesive!

- Country-specific safety and industrial safety regulations
- Material safety data sheet of manufacturer
- Processing instructions on glue cartridge

Storage:

Dry at 15°- 32 °C.

Shelf life:

The glue cartridge is marked with a date.

Do not use the adhesive after this date.

Surface pre-treatment:

See vehicle-specific repair instructions

Required cartridge gun:

Overview of glue cartridge guns

Preparing the glue cartridge:

The working temperature of glue cartridge must be at least 20°C.

Opened glue cartridges may be used again before the expiry date as long as a new mixing tube is used.

Insert glue cartridge into cartridge gun, remove cap and allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube. Only use mixing tubes supplied with glue cartridge.

Before starting to apply adhesive, allow approx. 1 mixing tube length of mixed adhesive to emerge. Only then apply the mixed adhesive to one side of the bonding surface.

Pot life of adhesive is approx. 60 minutes at 23°C.

2-component adhesive application:

Read the vehicle-specific repair instructions to determine the thickness and positioning of the adhesive bead.

After applying the adhesive, check whether an adhesive component has emerged at the back of the glue cartridge. If yes, break off the bonding procedure. Clean new part. Use new glue cartridge. Contact national hotline.

Remove contamination caused by adhesive residue immediately.

Hardened adhesive can only be removed mechanically.

Hardening time:

Do not move the vehicle before the adhesive has hardened.

Check the degree of hardness of the adhesive with a fingernail.

If the adhesive cannot be pressed in any further with a fingernail, the vehicle may be moved (without engine force) for further processing applications (e.g. painting).

Vehicle **strength for driving applications** is achieved after:

48 hours at an object temperature of 15°C.

10 hours at an object temperature of 23°C.



1 hour at an object temperature of 60°C.

0.5 hours at an object temperature of 85°C.

Important!

When using radiant heaters, make sure that the object temperature does not exceed 85 °C.
Excessively high temperatures will destroy the adhesive.

Disposal of adhesive:

Hardened adhesive is disposed of as normal waste.

Empty glue cartridges are disposed of as normal waste.

Non-hardened adhesives and mixtures of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.



41 00 ... Notes on adhesive K6

Important!

Note the following information before starting to apply adhesive!

- Country-specific safety and industrial safety regulations
- Material safety data sheet of manufacturer
- Processing instructions on glue cartridge

Storage:

Dry at 15°-25 °C.

Shelf life:

The glue cartridge is marked with a date.

Do not use the adhesive after this date.

Surface pre-treatment:

See vehicle-specific repair instructions

Required cartridge gun:

Overview of glue cartridge guns

Preparing the glue cartridge:

Do not prepare the glue cartridge until just before applying the adhesive.

The working temperature of glue cartridge must be at least 18°C.

Pot life of adhesive is approx. 10 minutes at 25 °C.

Insert glue cartridge into cartridge gun, remove cap and allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube. Only use mixing tubes supplied with glue cartridge.

Before starting to apply adhesive, allow approx. 1 mixing tube length of mixed adhesive to emerge. Only then apply the mixed adhesive to one side of the bonding surface.

Opened cartridges may be used again before the expiry date as long as a new mixing tube is used.

2-component adhesive application:

Read the vehicle-specific repair instructions to determine the thickness and positioning of the adhesive bead.

Hardening time:

See vehicle-specific repair instructions

Disposal of adhesive:

Hardened adhesive is disposed of as normal waste.

Empty glue cartridges are disposed of as normal waste.

Non-hardened adhesives and mixtures of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.



41 00 ... Notes on cleaning agent R1

Use only cleaning agent R1, as other cleaning agents cab be emollient/moistening or may start to dissolve the cathodic dip paint primer.



**Warning!**

Only used a high pressure cleaner approved by BMW!

Only specially trained persons of 16 years of age or older may work with the high pressure cleaner.

Check the high pressure cleaner and electrical wiring for visible damage.

Only use at a suitable location.

**Attention!**

Pay attention to following hazard warnings:

- Danger of injury due to water jet
- Contact with hazardous substances in spray
- Risk of skidding on wet floor
- Risk of stumbling due to hoses and cables
- Comply with notes and instructions on handling cleaning agents !
- Risk of scalding when cleaning with hot water.
- On electric or hybrid cars, the safety instructions for handling with hybrid cars are to be complied with.

**Warning!**

The following personal protective equipment is to be used:

- Safety goggles/face guard
- Suitable gloves
- Apron
- Rubber boots
- Ear protectors
- Safety shoes

**Attention!**

Notes on washing a vehicle with a high pressure cleaner:

- Do not wash directly on gaskets and control units during engine washes.
- A minimum distance of 30 cm must be adhered to for tyres and tyre valves.
- A minimum distance of 30 cm must be adhered to for the soft top and painted parts.
- Do not use if engine is still hot.
- Do not exceed maximum water temperature of 60 degrees.
- Do not spray directly onto cameras/sensors.





Attention!

- For your own safety, we recommend that you do not wash on the high-voltage components in electric or hybrid vehicles.



41 00 ... Notes on repairing threads

Important!

Install Helicoil thread inserts so that they are flush with the original thread.

Note:

Damaged threads may be repaired with Helicoil thread inserts. Comply with the procedure described in the example.

Screw connection	Vehicle	Bolting point(s)	Helicoil thread insert
Front axle support to engine support	R50, R52, R53,	All	M12x1.5x18
	R55, R56, R57, R58, R60	All	M12x1.5x18
Bracket, wishbone, to engine support	R50, R52, R53	All	M10x15
	R55, R56, R57, R58, R60	All	M10x15
Bracket, wishbone, to front axle support	R55, R56, R57, R58, R60	All	M14x1.5x21
Rear axle support to side member / cross member	R50, R52, R53,	All	M12x1.5x18
	R55, R56, R57, R58, R60	All	M12x1.5x18
Bearing support, trailing arm to side member	R50, R52, R53,	All	M12x1.5x18
	R55, R56, R57, R58, R60	All	M12x1.5x18



41 00 ... Notes on the water drain hose of the slide/tilt sunroof

The water drain hoses for the slide/tilt sunroof are partially permanently integrated in the body and cannot be replaced individually.

These water drain hoses can only be completely replaced with extensive body repair work (e. g. after an accident).

Component	Vehicle	Individually replaceable
Water drain hose, front	All BMW	No
	All MINI	
Rear water drain hose	E60, F34	No
	All other BMWs	Yes
	All MINI	Yes

An individual solution is required for damage that was not caused by an accident.

Contact national hotline.



99 Notes on using temperature-controlled infra-red radiators

When using temperature-controlled infrared radiators, damage to adhesive bonds, paint and vehicle components can occur when drying spatula and filler.

The temperature sensors in the infrared radiator only operate reliably on large, even surfaces.

On small surfaces such as C-pillars or sills, often only a colder, adjacent area is measured.

This leads to actual surface temperatures of up to 130°C, even if only 70°C is set on the infrared radiator.

When the rear side walls are partially replaced by bonding and riveting, these high temperatures can lead to a visible pattern in the area of the joint.

Remedy:

Check the surface temperatures on small component surfaces during the drying process with an external temperature sensor.

The general rule is: The surface temperatures must not exceed 85°C.

Important!

Do not use infrared radiators on carbon parts!

Risk of component destruction.



41 00 ... **Opening bonded connections**

1. Opening spot-welded adhesive joint

Open welding spots.

Warning!

Draw off vapour and gases!

Use personal protective clothing/equipment.

Heat connecting flange with a hot air blower. Heat components to max. 250 °C object temperature.

Release connecting flange with chisel.

Remove adhesive residue from connecting flange.

2. Opening bonded connections

Release any punch rivet or blind rivet.

Roughly cut out damaged component.

Warning!

Draw off vapour and gases!

Use personal protective clothing/equipment.

Heat adhesive flange with a hot air blower. Heat components to max. 250 °C object temperature.

The component can be peeled with the aid of pliers. Do not damage adjacent components.

Remove adhesive residue from connecting flange.

3. Opening bonded connections on aluminium roofs

Procedure is described in detailed in the relevant repair instructions.



41 00 ... **Opening brazed connections**

The "Bonding and Riveting" repair method involves replacing the watertight brazed connection with adhesive.

This gives rise to a new procedure for opening brazed connections.

Grind brazed seam with a belt grinder. This keeps the influence of heat in the area around the brazed seam as small as possible.

Important!

Never use a gas flame.

All traces of brazing solder do not have to be removed.

Do not grind body panels thin.



41 00 ... Opening rivet connections

Different rivet types are used on BMW vehicles.

1. Opening blind rivets:

1.1 Loosening blind rivets (N1, N2, N7, N8, N9 and N10):

Grind off blind rivet head with a belt or angle grinder. Do not grind off base material. Remove rivet remnants with a drift punch.

1.2 Opening blind rivets (N3 and N6):

Drill out blind rivet head with a 5 mm dia. drill bit. Do not damage base material. Remove rivet remnants with a drift punch.

2. Opening punch rivets:

2.1 Opening punch rivets by extraction:

This procedure is used on the reduced-weight aluminium front end.

Recommended tools and equipment:

- Stud welding apparatus (refer to Service Information 5 03 03 975) with gas bottle containing inert gas (82 % argon, 18 % CO₂).
- Stainless steel stud (sourcing reference via BMW Parts Department image board Aluminium and steel/bonding and welding)
- Universal riveting tool (refer to Service Information 5 03 03 975)

Grind off paint and dark grey coating of punch rivets.

Position bolt centrally on the rivet and weld on vertically. The area in which the bolts are welded on should be between the two grounding terminals. Position both terminals, if possible, on the top side of the panel on which the rivet is located.

Extract bolt with welded-on rivet using universal riveting tool. Use a large plastic nose piece if not otherwise specified in the repair instructions. Check plastic nose piece prior to use for wear.

Plastic nose piece must rest on sheet metal all round; if necessary, grind off plastic nose piece in collision area.

Do not push riveting tool forcefully onto special-steel bolts.

Do not use riveting tool to bend special-steel bolts.

Pay particular attention to central positioning of the bolt when using the small plastic mouthpiece.

Follow the equipment manufacturer's instructions for use.

2.2 Opening punch rivets by drilling out:

Drill out rivets with a 6 mm dia. carbide drill bit.

Punch rivets can be drilled out on both sides. When drilling from the protruding rear side, spot-drill the rivet shank only and remove the rest with a rivet punch.

Note:

Sand down and even out remaining burr on the rear side. Deburr bore holes.

Use a drift punch to remove punch rivet remnants in the aluminium (risk of corrosion).

Clean vehicle to remove swarfs (risk of corrosion).



41 00 ... Opening welded connections

1. Components made of steel:

1.1 Opening welding spots (resistance pressure spot welding):

Sheet steel panels made from high- and super-high-strength materials make great demands on the tools used.

Only with special carbide milling cutters can welding spots be drilled out on these sheet panels.

Use BTR/BOR milling cutters only in conjunction with Vario Drill spot-weld remover. Sourcing reference for spot-weld remover and BTR/BOR milling cutters, see Aftersales Assistance Portal (ASAP) - Service/Technology - Workshop Equipment (Start BMW) - Shop Workshop Equipment or at www.bmwgroup-wep.com.

- **Procedure:**

If necessary, surface-grind existing unevenness with a belt or angle grinder in the area around the welding spot.

Set punch mark in centre of welding spot. Set 8 mm dia. welding spot drill bit on punch mark and drill through top metal sheet.

Note: Because the welding spots may have surface-hardened, grind them if necessary with an angle grinder and paper grinding disc.

Use a chisel to separate the sheet metal flange and remove the component.

Follow the special procedure for spot welds .

1.2 Opening MAG weld seams and MIG brazing seams:

- **Procedure:**

Grind off weld seams with a belt or angle grinder. Do not grind the base material thin.

Use a chisel to separate the sheet metal flange and remove the component.

1.3 Opening laser weld seams:

Laser weld seams are used in the roof outer skin area.

- **Procedure:**

Roughly cut roof outer skin in the roof channel to improve accessibility.

Place angle grinder with grinding disc on laser weld seam and grind through top metal sheet. Be careful not to cut through and damage sheet metal underneath.

Remove sheet metal flange.

2. Components made of aluminium:

2.1 Opening MiG weld seams:

- **Procedure:**

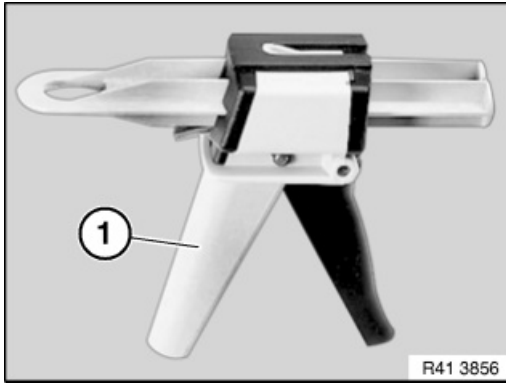
Grind off weld seams with a belt or angle grinder. Do not grind the base material thin.

Do not use a chisel.

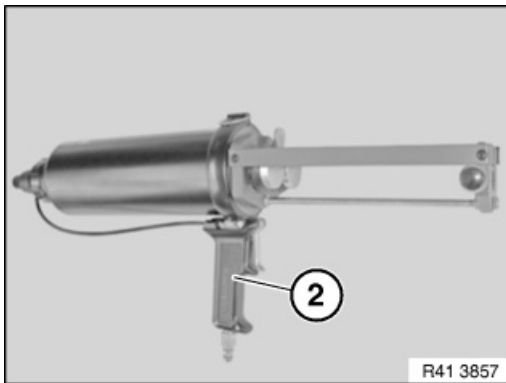
Remove component.



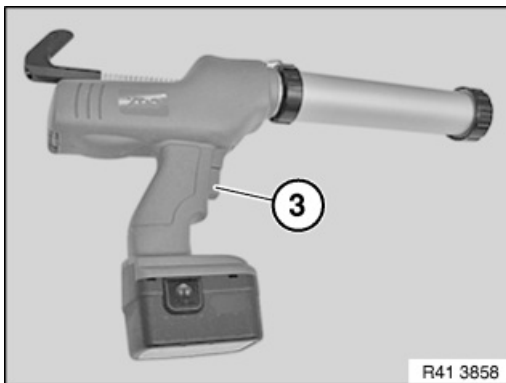
41 00 ... Overview of adhesive cartridge guns



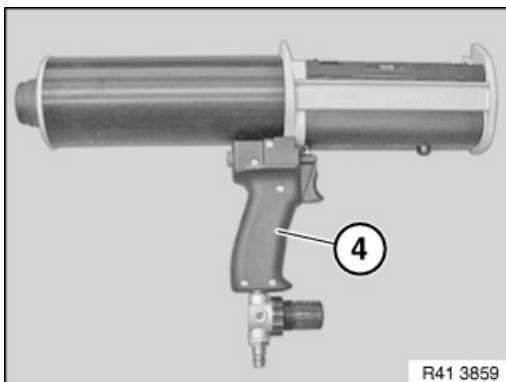
Adhesive gun 83 19 2 149 522
Obtainable via Electronic Parts Catalogue.
Usable for adhesives K4, K5a.
Usable for BMW 2K polyurethane foam.
Including insert 1:1 and 2:1.



Adhesive gun 81 49 0 443 166
Orderable via BMW Workshop Equipment Catalogue.
Usable for adhesive K3.



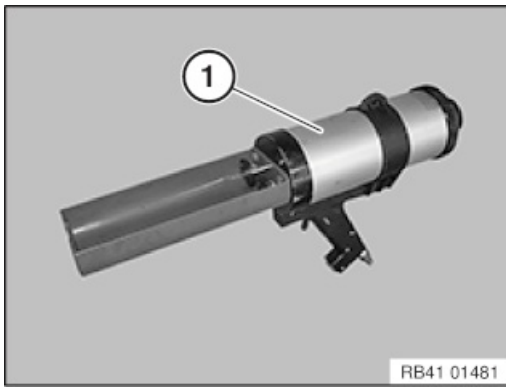
Adhesive cartridge gun 81 49 2 213 059
Orderable via BMW Workshop Equipment Catalogue.
Usable for adhesives K1, K5b, sealant D1/D2, window glass adhesive
and all 310 ml Euro cartridges.



Adhesive cartridge gun 83 30 0 494 836
Orderable via BMW Workshop Equipment Catalogue.
Usable for structural foam HS2.

Note:
Special tool number 41 3 010





Adhesive cartridge gun 81 49 2 355 475

Orderable via BMW Workshop Equipment Catalogue.

Usable for adhesive K2 (2x290 ml glue cartridge)



41 00 ... Overview of consumables (Electronic Parts Catalogue)

1.0 Adhesives

Designation, repair instructions	Naming of Electronic Parts Catalogue	Part number of Electronic Parts Catalogue	Remarks
Adhesive K1	Body adhesive K1	83 19 0 413 015	195 ml
Adhesive K2	Body adhesive K2	83 19 2 355 849	2x290 ml
Adhesive K3	Body adhesive K3	83 19 0 417 144	2 x 300 ml
Adhesive K4	Body adhesive K4	83 19 2 149 520	50 ml
Adhesive K5	Body adhesive K5	83 19 2 158 654	50 ml
Adhesive K5	Body adhesive K5	83 19 2 157 298	195 ml
Adhesive K6	Adhesive set K6	83 19 2 317 925	

1.1 Primer / activator

Designation, repair instructions	Naming of Electronic Parts Catalogue	Part number of Electronic Parts Catalogue	Remarks
PrimerP1	PrimerP1	83 19 0 302 556	50 ml
PrimerP2	Primer P2/Gas cartridge	83 19 0 302 555	50 ml
Betawipe 4800	Betawipe 4800	83 19 2 357 707	10 ml
Bonding base VP 206	Bonding base VP 206	83 19 9 407 777	30 ml
Aktivator 205	Aktivator 205	83 19 0 030 155	250 ml

1.2 Cleaning agent

Designation, repair instructions	Naming of Electronic Parts Catalogue	Part number of Electronic Parts Catalogue	Remarks
Filler S1	Alluvial tin replacement	83 19 2 464 575	175 ml

1.3 Fillers

Designation, repair instructions	Naming of Electronic Parts Catalogue	Part number of Electronic Parts Catalogue	Remarks
Cleaning agent R1	Cleaning agent R1	83 19 2 211 217	125 ml
Cleaning agent R2	Cleaning agent R2	83 19 0 417 324	500 ml
Cavity sealing wax remover	Cavity sealing wax remover	83 12 0 390 086	500 ml

2.0 Rivet

Designation, repair instructions	Naming of Electronic Parts Catalogue	Part number of Electronic Parts Catalogue	Remarks
Blind rivet N1	Blind rivet N1	83 19 0 301 414	dia. 6.5 mm; clamping range 2.8-4.8 mm
Blind rivet N2	Blind rivet N2	83 19 0 301 419	dia. 6.5 mm; clamping range 4.8-6.8 mm
Blind rivet N3	Blind rivet N3	83 19 0 301 421	dia. 4 mm; clamping range 1-3 mm
Punch rivetN4	Punch rivetN4	83 19 2 457 307	dia. 3 mm; length 4 mm



Punch rivetN5	Punch rivetN5	83 19 2 158 079	dia. 5 mm; length 5 mm
Blind rivet N6	Blind rivet N6	83 19 2 158 655	dia. 4 mm; clamping range 3-5 mm
Blind rivet N7	Blind rivet N7	83 19 2 240 352	dia. 6.5 mm; clamping range 1.5-3.5 mm
Blind rivet N8	Blind rivet N8	83 19 2 355 998	dia. 6.5 mm; clamping range 6.8-8.8 mm
Blind rivet N9	Blind rivet N9	83 19 7 239 634	dia. 6.5 mm; clamping range 8.8-10.8 mm
Blind rivet N10	Blind rivet N10	83 19 9 144 282	dia. 6.5 mm; clamping range 10.8-12.8 mm
Blind rivet N11	Blind rivet N11	07 14 7 391 057	Blind rivet for carbon connections dia. 4.8 mm; clamping range 2.2-4.7 mm
Blind rivet N12	Blind rivet N12	07 14 7 391 046	Blind rivet for carbon connections dia. 4.8 mm; clamping range 4.5-7.5 mm

2.1 Plastic nuts

Designation, repair instructions	Naming of Electronic Parts Catalogue	Part number of Electronic Parts Catalogue	Remarks
Cap nut	Plastic nut	51 16 1 943 122	Dia. 18 mm
Cap nut	Plastic nut	07 14 7 169 847	Dia. 22 mm

3.0 Primer/paint spray aerosol

Designation, repair instructions	Naming of Electronic Parts Catalogue	Part number of Electronic Parts Catalogue	Remarks
Primer	Emergency program base filler 2K spray	51 91 0 432 615	200 ml; application time 8 h
Welding primer	INOX spray welding primer	83 40 0 409 992	500 ml
Paint spray aerosol, cathodic dip coating, grey	Paint spray aerosol, inside filler of spare wheel well	51 91 0 411 026	400 ml
Spray can, black, matte	Spray paint, black matt	51 91 1 900 346	400 ml

4.0 Sealant

Designation, repair instructions	Naming of Electronic Parts Catalogue	Part number of Electronic Parts Catalogue	Remarks
Sealant D1 Sprayable sealant	Seam sealing	83 42 2 409 985	310 ml
Sealant D2	Seam sealing, spreadable	83 42 2 409 986	310 ml

5.0 Cavity preservation

Designation, repair instructions	Naming of Electronic Parts Catalogue	Part number of Electronic Parts Catalogue	Remarks
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Cavity sealant	Cavity sealant spray	83 42 2 457 337	400 ml
Cavity sealant	Cavity preservation	83 42 2 457 338	1000 ml

6.0 Cavity foam

Designation, repair instructions	Naming of Electronic Parts Catalogue	Part number of Electronic Parts Catalogue	Remarks
Cavity foamHS1	Cavity foam	83 42 9 410 694	400 ml
Structural foamHS2	Structural foam	83 19 0 007 361	420 ml
Cavity foamHS3	2K polyurethane foam	83 42 2 288 930	50 ml

7.0 EMC screw (electromagnetic compatibility)

Designation, repair instructions	Naming of Electronic Parts Catalogue	Part number of Electronic Parts Catalogue	Remarks
EMC screw	Screw	83 19 0 301 639	SF Plus M5x15

8.0 Twist drill

Designation, repair instructions	Naming of Electronic Parts Catalogue	Part number of Electronic Parts Catalogue	Remarks
Drill bit	Drill bit	83 19 2 460 424	4.2 x 120 mm
Drill bit	Drill bit	83 19 2 460 425	6.8 x 150 mm
Drill bit	Twist drill	83 19 2 166 463	4.2 x 55 mm
Drill bit	Twist drill	83 19 2 166 464	6.8 x 74 mm
Drill bit	High-strength drill	83 19 2 359 262	6.8 x 79 mm
Drill bit	High-strength drill	83 19 2 359 263	4.2 x 66 mm

9.0 Grinding material

Designation, repair instructions	Naming of Electronic Parts Catalogue	Part number of Electronic Parts Catalogue	Remarks
Non-woven abrasivesS1	ScotchBrite Multiflex A, very fine	51 91 0 402 967	

10.0 Spacer

Designation, repair instructions	Naming of Electronic Parts Catalogue	Part number of Electronic Parts Catalogue	Remarks
Spacer	Adhesive tape	51 71 7 901 759	

11.0 Adhesive tape

Designation, repair instructions	Naming of Electronic Parts Catalogue	Part number of Electronic Parts Catalogue	Remarks
Aluminium adhesive tape	Adhesive tape	11 00 7 769 948	Width 50 mm

12.0 reinforcement plates



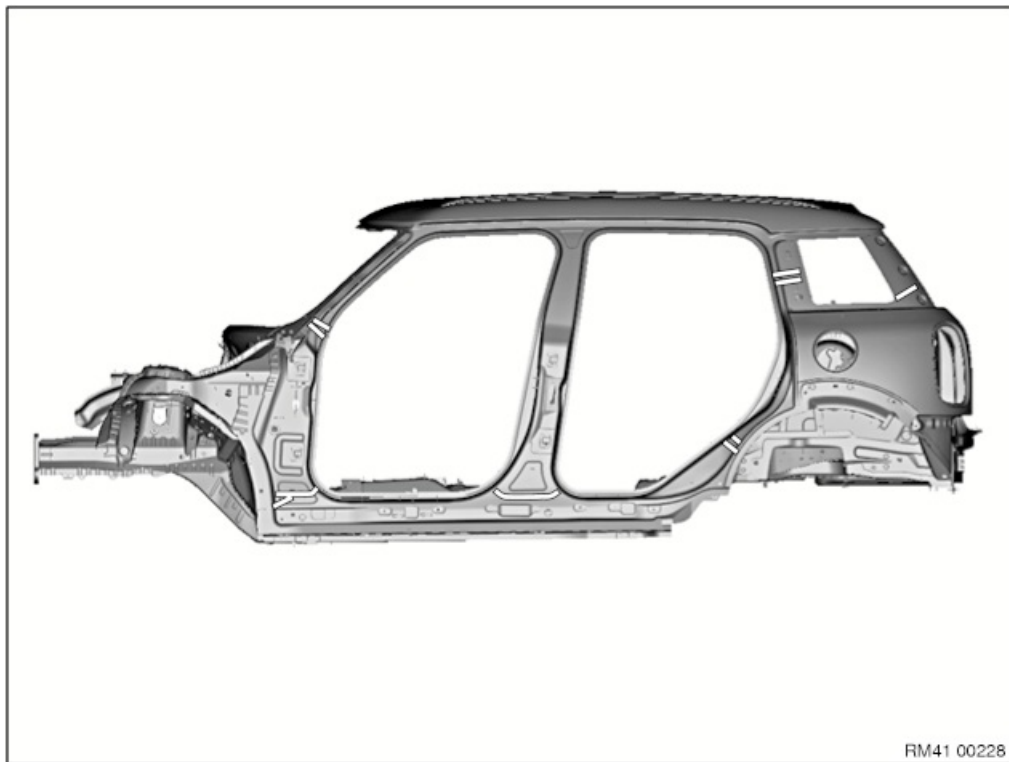
Designation, repair instructions	Naming of Electronic Parts Catalogue	Part number of Electronic Parts Catalogue	Remarks
Reinforcement plate, universal	Reinforcement plate, universal	41 21 7 275 563	



41 00 ... Position of shaped parts for cavity sealing

To reduce interior noise and avoid condensation, cavities in certain areas of the body are closed off. To do this, shaped parts are inserted in the cavities. These shaped parts adapt themselves optimally due to heating of the body to approx. 180 °C by expanding to the shape of the cavities.

Because it is not possible to heat the body to this extent for a body repair, a different procedure has been specified for this situation.



41 00 ... Punch rivets

The "Bonding and Riveting" repair method involves the use for the first time of punch rivets in the repair. This requires new tools and procedures.

The punch rivets are matched in size to the material thickness and quality used at the respective connection point.

1.0 Recommended tools and equipment

- Punch rivet tool (see Service Information 05 03 09 (535))

Sourcing reference via Aftersales Assistance Portal (ASAP) - Service/Technology - Workshop Equipment (Start BMW) - Shop Workshop Equipment or at www.bmwgroup-wep.com.

Setting punch rivets:

- Refer to the vehicle-specific repair instructions for the punch rivet size.
- Mark the positions of the rivets on the vehicle. Set punch rivets at roughly equal spacings. Punch rivets do not require a predrilled hole. They are pressed directly into the full material.
- Insert punch rivet in riveting die. Position punch rivet tool on sheet metal parts to be riveted.

Riveting direction:

Always from new part to used part.

Deviations are specified in the vehicle-specific repair instructions.

- Rivet punch rivets with punch rivet tool. In the meantime clean riveting die and matrix if fouled with adhesive.
- Seal punch rivets in moist area (e.g. wheel arch or carrier support) on both sides with sealantD1 (risk of corrosion).
- Seal cavities after painting vehicle with cavity sealant (risk of corrosion).



41 00 ... **Quality standard**

- The overall requirements relating to a vehicle can only be implemented by including "all" components. This applies in particular to the body. With regard to an optimum crash result, it is necessary to maintain the structural measures.

The procedures described in the repair instructions must be complied with. Deviations are only permitted after arrangement with and approval by BMW. Should you have any questions, please contact the country-specific Hotline.

The use of non-approved repair steps or tools may have serious consequences for the structure of the vehicle (e.g. in the event of a crash). In the end, this can result in safety and product liability risks which cannot be calculated.

Corrosion protection measures during and after repair work are vital for ensuring the vehicle retains its value.

- For repair work, only use original BMW/MINI parts, or parts that are of an equivalent quality, and approved auxiliary materials and operating fluid.

For repairs that are settled by a warranty or goodwill, only original BMW/MINI parts may be used.



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41 00 ... Reinforcement plate (bonded)



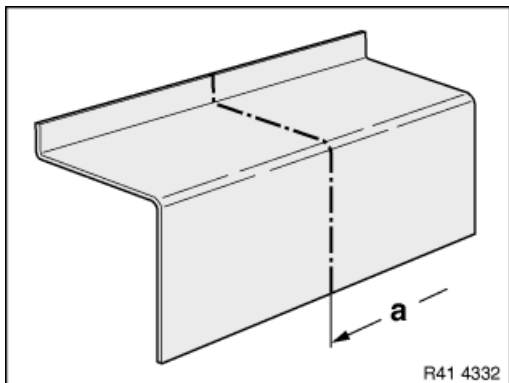
In the case of a partial replacement piece, a body component is cut at a point described in the repair instructions.

A reinforcement plate is bonded in to ensure sufficient strength.

Observe notes on repair stage 2 .

Note:

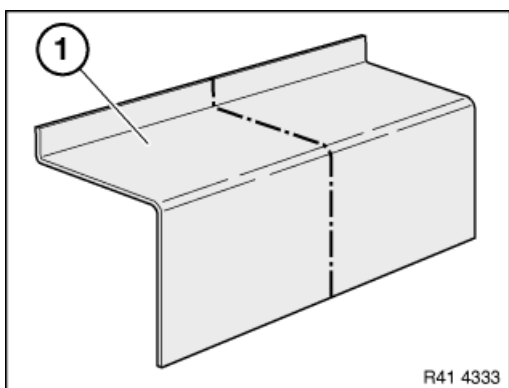
The following graphics serve as general illustrations of reinforcement plate repair work. They apply to sectional repairs to the structure.



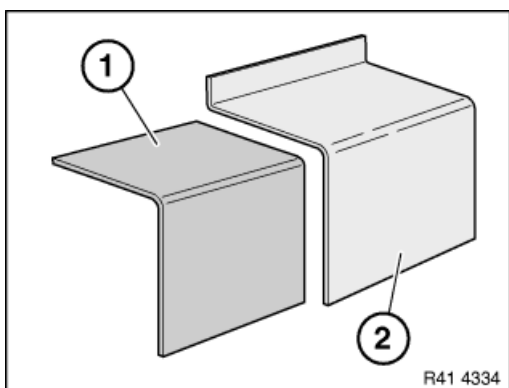
Mark component in accordance with measurement a and cut.



Preparation of new part:



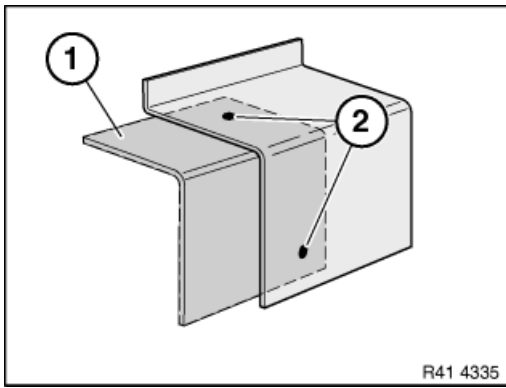
Cut new part (1) in accordance with cut on vehicle and if necessary adjust to fit with straightening attachment or universal mount.



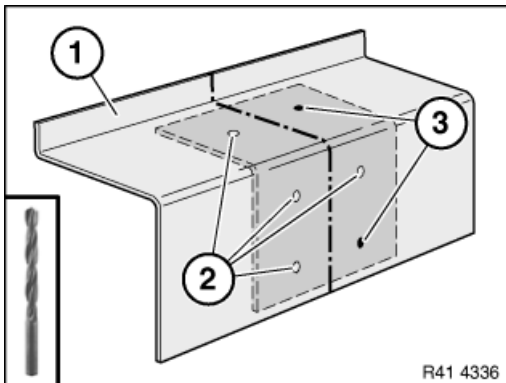
Make reinforcement plate (1) from trim of new part (2).

Length of reinforcement plate is 80 mm.





Slide reinforcement plate (1) half-way into component on body and fasten with 2 self-tapping screws (2).



Adjust new part (1) to fit and set 4.3 mm dia. bore holes (2).

Remove new part again.

Release self-tapping screws (3).

Remove reinforcement plate.

Drill out bore holes (3) for screws to 4.3 mm dia.

Deburr all bore holes.

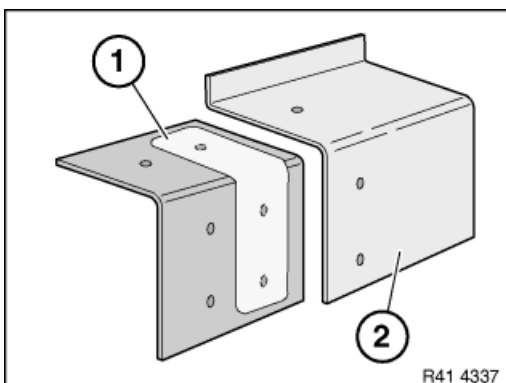


Important!

Do not grind new part and body in area of bonding surfaces.



Installing reinforcement plate



Clean all bonding surfaces with cleaning agent R1.

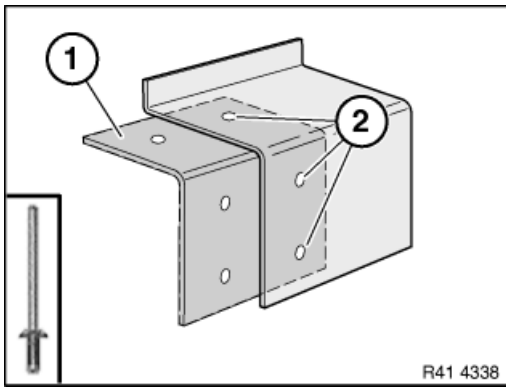
Apply adhesive (1) to reinforcement plate bonding surface.

Carefully slide reinforcement plate half-way into body component (2).

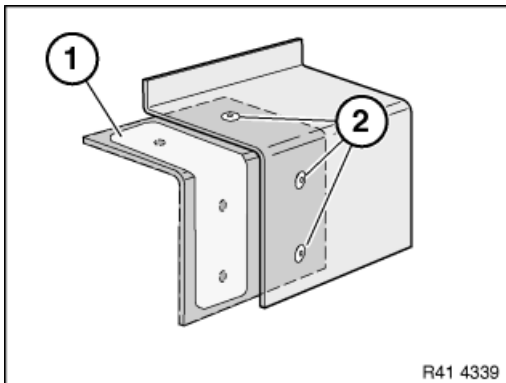
Important!

When joining reinforcement plate, make sure there is sufficient adhesive on bonding surfaces.

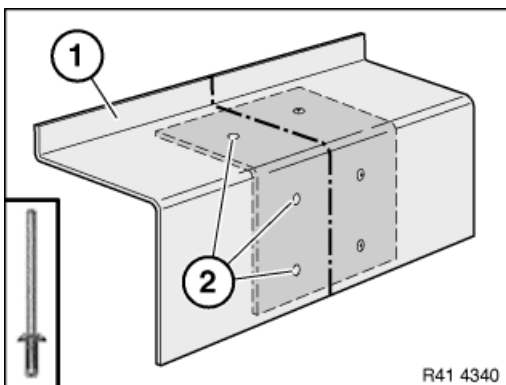




Rivet reinforcement plate (1) up to half-way with blind rivets N3 (2).



Apply adhesive (1) to reinforcement plate bonding surface.



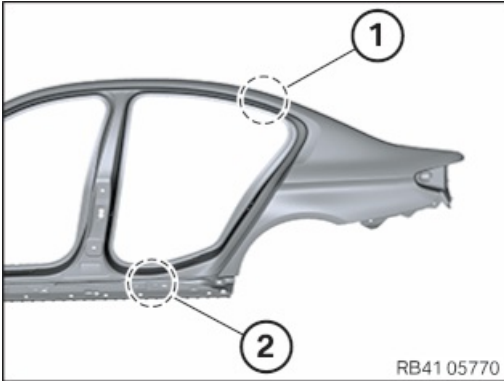
Install new part (1) with straightening attachment or universal mount and rivet with blind rivets N3 (2).

After adhesive has hardened, flatten adhesive area and seal blind rivets.





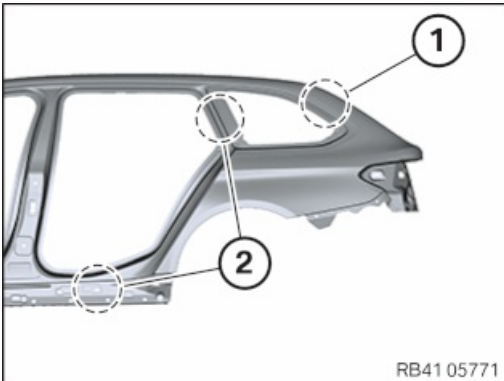
When replacing the rear side panel, reinforcement plates are bonded or welded on the separation points.



Applicable to Saloon, hatchback, Coupé.

Welding is done in area (1) (incl. water channel).

Bonding is done in area (2).



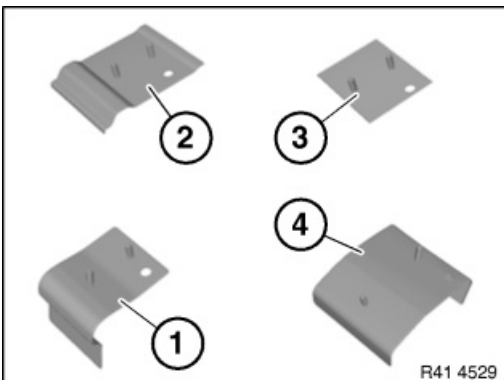
Applicable to Touring, X models, Gran Coupé, Gran Turismo.

Welding is done in area (1) (incl. water channel).

Bonding is done in areas (2).

Note:

The following graphics serve as general illustrations of reinforcement plate repair work. They apply to sectional repairs on the outer skin which are produced using the adhesive joining method.

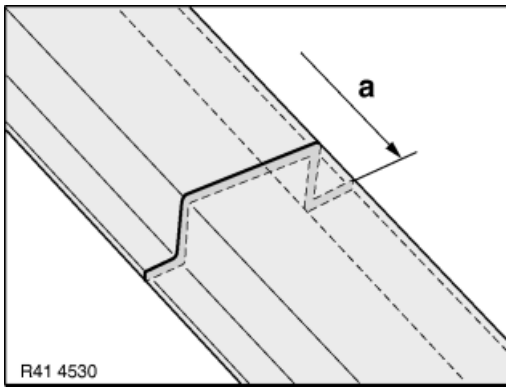


Overview of the reinforcement plates (for sourcing reference, see Electronic Parts Catalogue):

- (1) Reinforcement plate, sill
- (2) Reinforcement plate, C-pillar
- (3) Reinforcement plate, universal
- (4) Reinforcement plate, C- or D-pillar
- (5) Nuts (not shown)

- Plastic nut dia. 18 mm, part number 07 14 1 943 122
- Plastic nut \varnothing 22 mm, part number 07 14 7 169 847





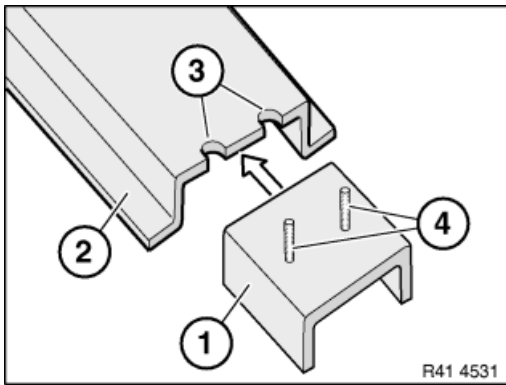
Mark side panel according to dimension a and detach it.



Preparation of the reinforcement plate (bonded or welded)

Some reinforcement plates are oversized.

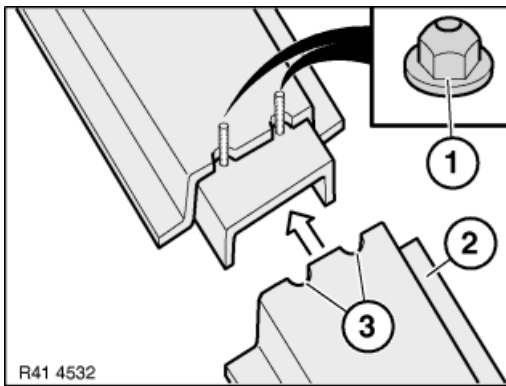
It may be necessary to rework the reinforcement plates at the edges or cut them to size until they rest against the outer skin free of tension.



Adjust reinforcement plate (1) to fit in component (2) on vehicle.

Make semicircular recesses (3) for the stud bolts (4).

Diameter of recesses approx. 10 - 12 mm.



Fix the reinforcement plate using plastic nuts (1).

Fit new part (2).

Make semi-circular recesses (3) in the new part.

Diameter of recesses approx. 10 - 12 mm.

Remove reinforcement plate.

Note:

Bonded reinforcement plates:

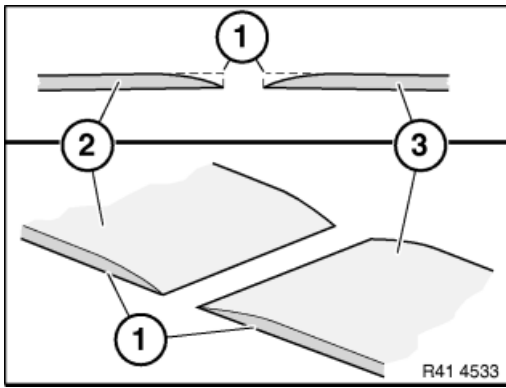
Width of joint between new part and component on vehicle approx. 5 - 8 mm (at least 30 mm flange width per side).

Welded reinforcement plates:

Width of joint between new part and component on vehicle approx. 2 - 3 mm.

Grind down to the metal in the area of the joint.





Carry out the following step only if the reinforcement plates are bonded.
Chamfer cutting edges (1) on joint by grinding.

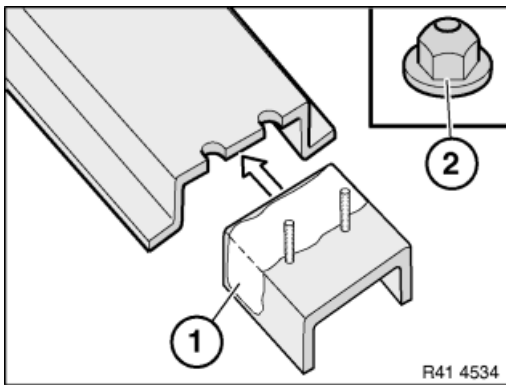
(2) Component on vehicle

(3) New part

If the cutting edges have not been sufficiently chamfered, there may be voids in the paintwork after painting.



Installing bonded reinforcement plate



Clean all bonding surfaces.

Apply the adhesive in area (1) on the reinforcement plate.

Apply more adhesive in the radii to avoid air pockets.

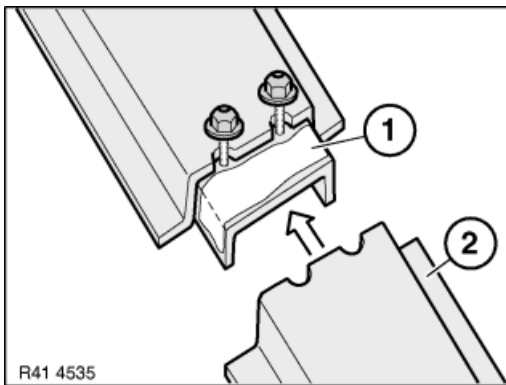
Apply additional adhesive to the outer skin around radii.

Slide the reinforcement plate carefully into the component on the vehicle and fix plastic nuts (2).

Screw on the nuts with only a few turns.

Attention!

When joining the reinforcement plate, make sure that there is sufficient adhesive on the bonding surfaces!



Apply the adhesive on bonding surface (1) of the reinforcement plate.

Apply more adhesive in the radii to avoid air pockets.

Apply additional adhesive to the outer skin around radii.

Fit new part (2).

Align new part to adjoining component and secure with gripping pliers.

First tighten the plastic nuts at the radii.

Only then tighten all the plastic nuts in the flat areas.

Tightening torque 41 14 1AZ.

Attention!

Check that the transition of the components is OK at the separation point. Corrections can only be made before the adhesive has hardened. Straightening at a later stage is not possible.

After adhesive has hardened:

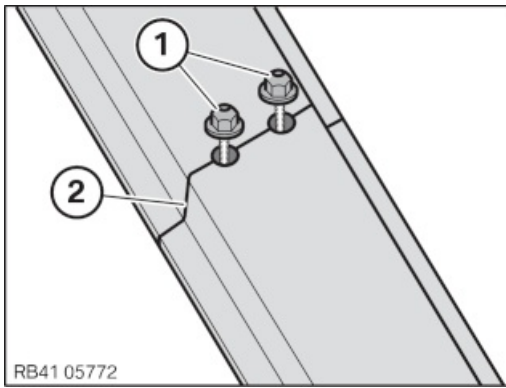
Grind off stud bolts and surplus adhesive flush.

Paint area as specified in BMW Painting Handbook.



Installing welded reinforcement plate





Attention!

Risk of damage!

Protect the adjacent components from heat and flying sparks.

Align new part to adjoining component and secure with gripping pliers.

First tighten the plastic nuts at the radii.

Only then tighten all the plastic nuts in the flat areas.

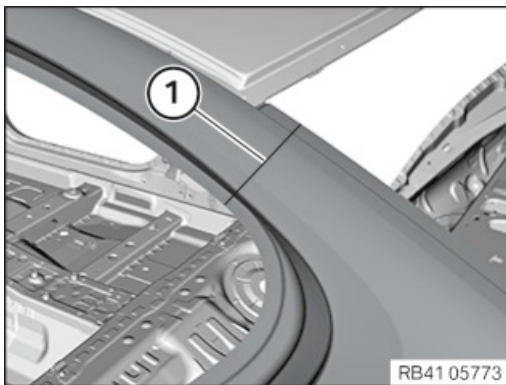
Tightening torque 41 14 1AZ.

Weld joint (2) between plastic nuts (1).

Release plastic nuts (1).

Grind down stud bolt until flush.

Weld joint (2) in the remaining areas.



Grind weld seam (1) until flush.

If necessary, straighten area (1) and level it with a multi-functional spatula.

Paint area as specified in BMW Painting Handbook.



41 00 ... **Repair methods, repair stages 1**

All work as part of which screwed body components must be replaced.

Repair techniques -> Repairing threads

Repair stage 1a

- > Blind rivet
- > Blind rivet nuts and bolts
- > Glass pane

All procedures during which repairs are to be done on the outer skin.

Repair techniques -> Straightening outer skin -> Straightening aluminium parts

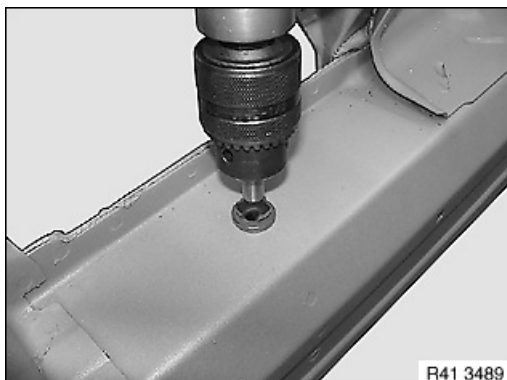
Repair stage 1b

- > Straightening steel components
- > Repairing plastic components
- > Grinding
- > Grinding aluminium components
- > Grinding steel parts



**Protective measures!**

- Wear safety goggles
- Wear protective gloves

**Important!**

To prevent the material from tapering, do not drill out the rivet head.

1. Carefully spot-drill rivet head with a larger drill bit/countersink

**Important!**

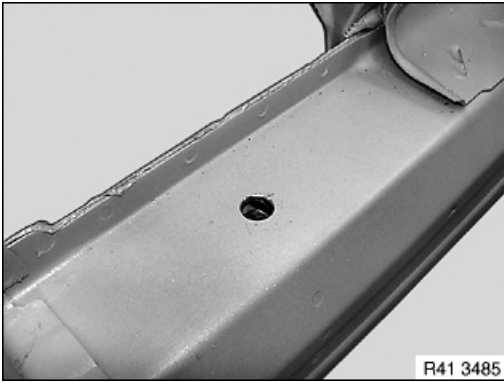
Avoid paint damage

2. Knock rivet head away with a chisel



3. Punch through rivet shank into cavity, remove if necessary





4. Clean component, eliminate paint damage if necessary



If the rivet shank can be removed: Important!

To avoid corrosion, stop chips/swarf by means of cavity preservation.

Follow notes on corrosion protection.

5. Preserving cavity



If the rivet shank cannot be removed: Warning!

Danger of injury!

Observe notes on cavity foam.

Important!

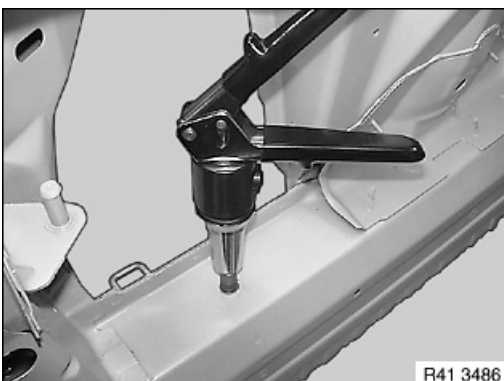
To avoid corrosion and rattling noises, stop chips/swarf and rivet nut shank with cavity foam.

Remove foam remnants with isohexane (benzine).

5. Stop rivet shank by means of specific foaming
6. Set rivet nut with hand rivet gun

Note:

Fit rivet nut as quickly as possible, ideally before the cavity foam hardens.



Hexagon / straight shank rivet nut (up to thread M8) with hand rivet gun ZS308 Important!

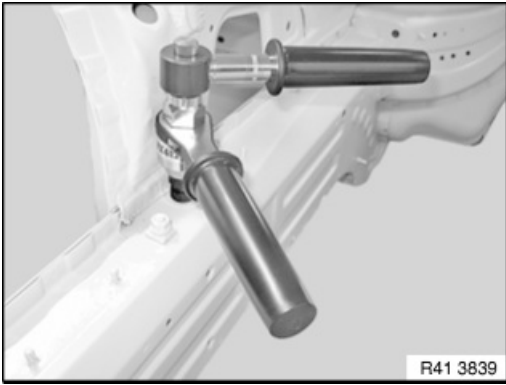
Follow manufacturer's operating instructions.

Make sure rivet nut correctly contacts component.

Note:

According to the manufacturer, the pictured tool is suitable up to an M8 thread (see Aftersales Assistance Portal (ASAP) - Service/Technology - Workshop Equipment (Start BMW) - Workshop Equipment Shop or www.bmwgroup-wep.com).





Hexagon / straight shank rivet nut (up to thread M12) with hand rivet gun MB512 Important!

Follow manufacturer's operating instructions.

Make sure rivet nut correctly contacts component.

Note:

According to the manufacturer, the pictured tool is suitable up to an M12 thread (see Aftersales Assistance Portal (ASAP) - Service/Technology - Workshop Equipment (Start BMW) - Workshop Equipment Shop or www.bmwgroup-wep.com).



41 00 ... **Repair techniques, repair stage 2**

Repairs that are carried out by bonding and riveting and/or welded with MAG welder without the use of a straightening bench.

- Repair techniques**
- > Removing used part
 - > Opening welded connections
 - > Opening brazed connections
 - > Opening rivet connections
 - > Opening bonded connections
 - > Grinding aluminium components
 - > Grinding steel components
 - > Sectional repair
 - > Installing new part
 - > Reinforcement plate (bonded)
 - > Notes on consumables
 - > Notes on adhesive
 - > Bonding on painted surfaces
 - > Blind rivet
 - > Punch rivets
 - > Welding steel components
 - > Cavity sealing
 - > EMC screws



41 00 ... Repair techniques, repair stage 3

Repairs that are carried out by bonding and riveting with the use of a straightening bench or welding.

- Repair techniques**
- > Straightening structure
 - > Straightening aluminium components on the structure
 - > Straightening steel components on the structure
 - > Removing used part
 - > Opening welded connections
 - > Opening brazed connections
 - > Opening rivet connections
 - > Opening bonded connections
 - > Removing carbon components
 - > Grinding aluminium components
 - > Grinding steel components
 - > Sectional repair
 - > Welding in reinforcement plate (sheet steel)
 - > Sectional repair (steel) with repair element
 - > Sectional repair (aluminium) with repair element
 - > Installing new part
 - > Welding aluminium components
 - > Welding steel components
 - > Spot-weld bonding steel components
 - > Soldering steel components
 - > Notes on consumables
 - > Notes on adhesive
 - > Bonding aluminium on steel
 - > Bonding steel on steel
 - > Blind rivets
 - > Punch rivets
 - > Cavity sealing
 - > EMC screws



63 12 ... Repairing headlights

It is possible to repair the following damage:

- Deformed or broken holders can be replaced using the available repair kits.
Replacement of headlight is **not required**!
For reasons of pedestrian safety it is **not permitted** to use adhesive or reinforcements to repair broken holders!

Note:

Headlight repair kits are not available for every vehicles (see Electronic Parts Catalogue).

Follow the vehicle-specific repair instructions.

It is not possible to repair the following damage:

- Deformed or broken headlight housing.
- Scratched or damaged headlight lenses
The standard coating of headlight lens cannot be restored. Commercially available repair systems are unable to provide sufficient protection from ultraviolet radiation and external influences (stone chipping).



41 00 ... Repairing plastic components

1.0 General notes

- In general, the economic viability must be checked prior to the repair.
- The following painted components on the outer skin are suitable for repair:
 - Bumper panels (exception: E52)
 - Side sill trim panels
 - Side Panels
 - Door outer skin
 - Hardtop/roof
 - Soft top compartment lid
 - Rear lid
- **It is possible to repair the following damage:**
 - Slight deformations without visible cracks in the paint.
Visible cracks reach the component and it is not possible to permanently rectify the damage. Cracks once again become visible on the paintwork after a certain period of time.
 - Slight damage, e.g. scrapes, if the component underneath does not become visible.
 - Cracks, holes up to 2.5 centimetre in length.
Cracks must **not** reach the edge of the component.
- **Attention!**
The following components **cannot** be repaired:
 - Components that are not painted as standard.
Unable to restore grained surface.
 - Fuel tank, fluid tank (e.g. window washer system, brake fluid, coolant expansion tank, etc.)

2.0 Reshaping of plastic parts

- A hot air blower can be used to reshape plastic parts as per the aforementioned criteria.

3.0 Bonding of plastic parts

Important!

Conform with safety regulations!

- A plastic repair box is offered (sourcing reference via BMW Parts Department) for inexpensive repair with fair time values.
- The procedure for repair of plastic parts is included in the plastic repair box.
Clamps or other metal reinforcements must **not** be used for reasons of pedestrian protection.

4.0 Welding plastic parts

- Plastic welding procedures are permitted as they are cost-effective repairs in line with the components' current value.
- Clamps or other metal reinforcements must **not** be used for reasons of pedestrian protection.



41 00 ... Replacing blind rivets



Special tools required:

- 2 348 128
- 72 1 210

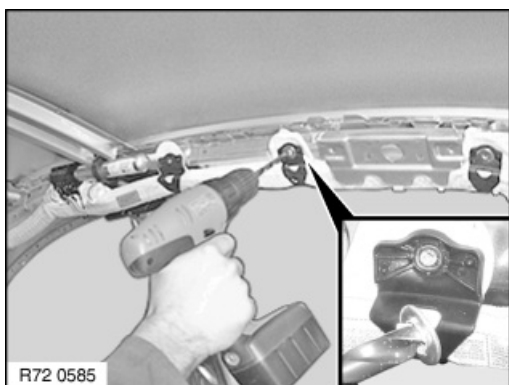


Important!

Lay out protective mats to protect the interior equipment against swarf from the drilled-out rivets and damage.

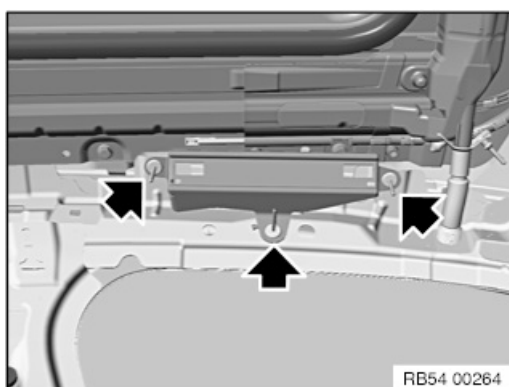
Lay out protective mats in the relevant working area:

- Instrument panel
- Entrance area
- Passenger compartment



Schematic diagram of folding pack holder for head airbag:

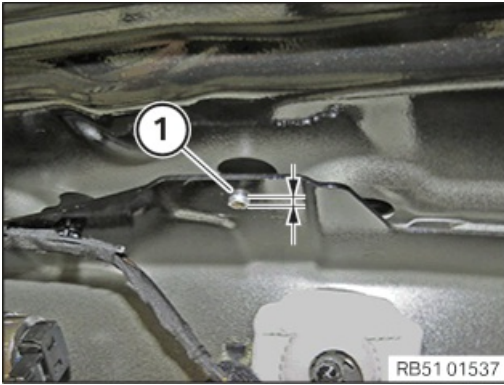
Drill off rivet plate down to rivet shank with a 10 mm twist drill bit.



Described for grab handle holder:

Drill off rivet plate down to rivet shank with a 10 mm twist drill bit.





Drill out all blind rivet protrusions (1) up to the body.



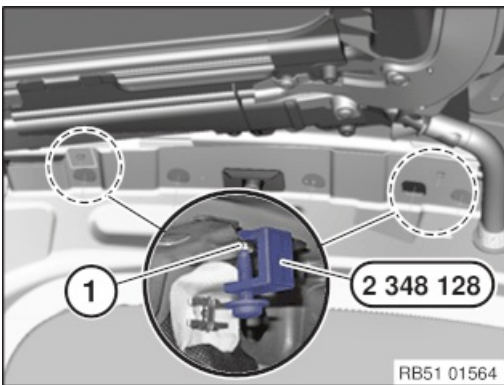
Installation note:

Apply primer to paintwork damages on side frame.

Note:

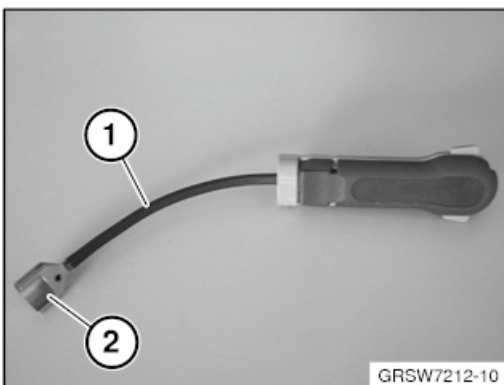
Depending on accessibility, the rivet heads will have to be removed using special tool 2 348 128 or 72 1 210.

In areas that cannot be reached using special tools, cavity foam HS3 must first be applied around the rivet head before the rivet head is then punched out immediately..



Removal of rivet head with special tool 2 348 128:

Press off rivet heads (1) using special tool 2 348 128 and remove.



Removal of rivet head with special tool 72 1 210:

Shank (1) of special tool 72 1 210 is flexible and can be adapted to the relevant body contours.

Note:

Insert butyl in the collecting tray (2) to secure rivet heads and prevent them from falling out.





Insert special tool 72 1 210 through bore hole in body next to attachment points.

Position special tool from rear on rivet head in cavity.

Note:

A second person will be needed to help hold the special tool on the rivet head during the driving-out operation.

Make sure collecting tray is correctly fitted on rivet head.

Drive out stem with hammer and 6 mm punch.

Carefully feed special tool out of body so that rivet head does not fall out of collecting tray.



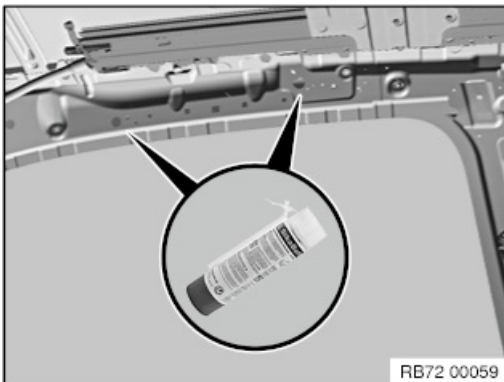
Note:

If the rivet falls out of the collecting tray into the side frame when the special tool is fed out, this area must be generously filled with foam.

For details of procedure for filling cavities with foam, see further operations.

Use cavity preservation (refer to BMW Group Parts) for foam filling.

Cavity foam (refer to BMW Group Parts) may also be used if required.



Fit tube to foam can.

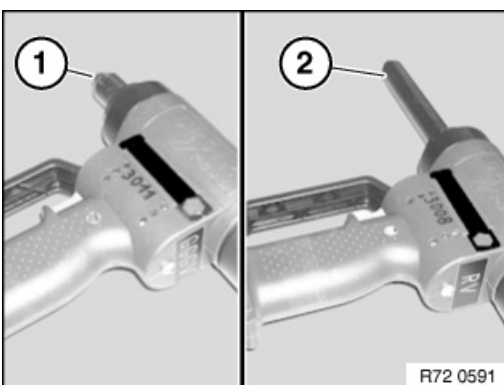
Push the hose in through the pillar holes.

Fill cavity with a filling material.

Warning!

Empty foam can completely onto cardboard and after hardening dispose of foam and can in residual waste.

Can may burst if not completely emptied.



Overview of rivet gun:

Riveting of gas generator housing and holders for folding pack with rivet gun (refer to BMW Workshop Catalogue).

The interchangeable head is changed for the different work operations.

Riveting of gas generator housing with:

- 1.) 17/36 nosepiece and short shank

Riveting of holders for folding pack:

- 2.) 17/40 nosepiece and long shank



41 00 ... Safety at work

Note national regulations.

1.0 Compressed air:

- Air guns must not be pointed at individuals. "Blowing off" the body with compressed air may lead to serious injury.
- The devices are not permitted to be cleaned with compressed air due to dust contamination.

2.0 Electrical systems/devices:

- Only perfectly functioning systems and devices may be used.
- Repairs on electrical systems and devices must only be performed by certified electricians.

3.1 Working with aluminium dust:

- Wear a fine dust mask.
- The following applies only to E52 and BMWi: Use explosion-proof exhaust extraction unit.
- Note national regulations.

3.2 Removing sealant.

- Hydrochloric acid is created when PVC sealing material is heated to temperatures in excess of 180 °C.
- Remove PVC sealant with a rotating wire brush only or heat material with a hot air blower to maximum 180 °C and remove with a spatula.
- For good ventilation or direct extraction.

3.3 Arc welding and brazing solder:

Important!

The extremely bright arc during welding may cause serious injury to the eyes if appropriate protective measures are not taken.

- Use a welding screen suitable for the relevant welding method (metal active gas or metal inert gas).
- Separation of workbays with protective curtains.
- Use a welding-emissions extractor facility.
- Wear protective clothing and gloves suitable for welding (not combustible).
- A fire extinguisher must be located within reach of the welding area.
- Do not carry out any welding work in the proximity of a fuel tank e.g. when it is installed.
- Note national regulations.

3.4 Working with chemical products (adhesive, cleaning agents, fillers, etc.):

Heed the manufacturer's material safety data sheets.

Important!

Handling chemical products may result in allergic skin and breathing reactions.

- Do not eat, drink or smoke while working with these products.
- Avoid direct contact with eyes and skin.
- Wear safety goggles, protective gloves and if necessary an apron.
- For good ventilation or direct extraction.
- Use a breathing apparatus with a suitable filter type when ventilation is insufficient.
- Wear impermeable protective clothing.
- Immediately change contaminated work clothing.
- After finishing work, thoroughly clean your hands and apply protective skin cream.
- Always keep an eye douche on hand, change the water regularly (once a month).



- Store bonding products in a secure cabinet only.
- Keep bonding products away from naked flames and other ignition sources.
- Protect bonding products against strong heat sources and direct sunlight.
- Note national regulations.

First Aid:

If product comes in contact with eyes, immediately flush with running water for about 10 -15 minutes. Seek the advice of eye specialist.

In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. If necessary, consult a doctor.

If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.

After inhaling adhesive vapours ensure ample supply of fresh air. Stay calm. Keep air passages open. Consult a doctor.

3.5 Working with carbon dust:

- Do not eat, drink or smoke while working with these products.
After finishing work, thoroughly clean your hands. Use protective hand cream.
- Fire, smoking and naked flames are forbidden.
- Wear work clothes, safety shoes, safety goggles and protective gloves.
- Only carry out grinding and cutting work with explosion-proof extraction (BMW_i only).
- Wear ear protectors.
- Wear a dust mask (minimum protection class FFP2).
- Avoid carbon dust contact with skin, eyes and clothing.
- Regularly clean the working area with a vacuum cleaner and wipe the surfaces with a damp cloth.
- Separate workbay by means of mobile partition walls or protective curtains.



00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



Warning!

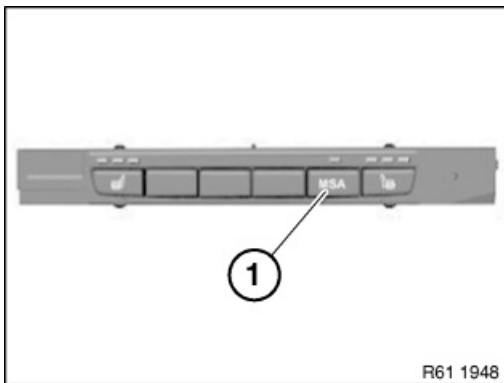
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

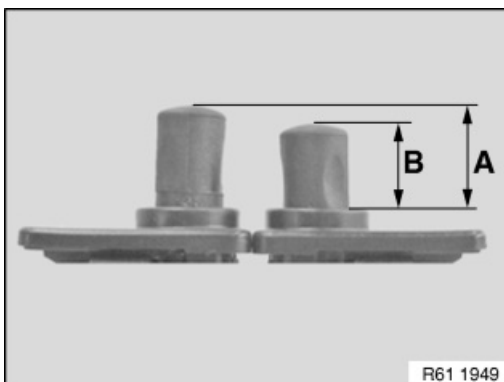
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode
A = 10 mm
 - Basic setting (engine hood/bonnet open)
B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



When working with diagnosis tools:

- Observe instructions in diagnosis tool





Note:

For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) Service Information (bulletin) 61 01 07 335
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) Service Information (bulletin) 61 01 10 629



41 00 ... **Safety instructions for handling magnets**

Precautionary measures are necessary when handling magnets in order to exclude any potential danger.

If the distance between the magnets falls below the minimum distance, the magnets will be abruptly attracted to each other. The brittle magnets will then collide with each other at high speed.

Very sharp splinters (similar to glass splinters) may then be chipped off.

Crush or cut injuries may also be caused.

Observe the manufacturer's safety data sheets.

Warning!

- Danger of crush injuries
- Danger of injury due to splinters
- Danger of injury due to magnetic fields

Handling instructions

- Wear safety goggles and protective gloves.
- Persons with heart pacemakers must not use the magnets.
- Do not store any iron parts (tools, small parts) close to the magnets.
- Keep magnets away from magnetic data media (credit cards, memory cards).
- Do not machine the magnets.
- Keep the magnets away direct heat and naked flames.
- Do not eat, drink or smoke while working with these products.



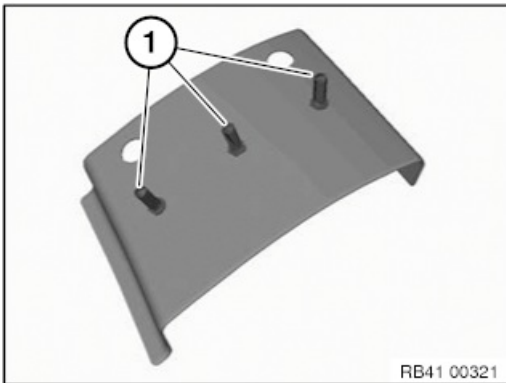


In the case of a partial replacement piece, a body component is cut at a point described in the repair instructions.

A template may be used for the exact position determination for the separating cut.

The template is made from the reinforcement plate and can be reused.

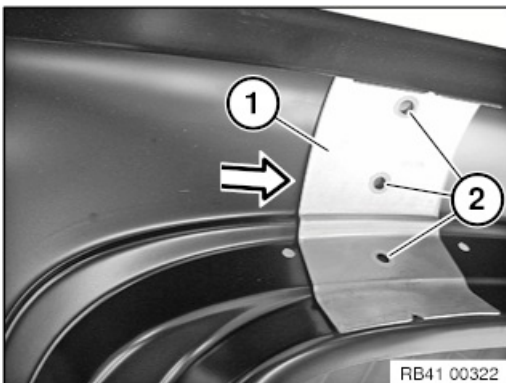
Carry over schematic diagram at the separation cut C-pillar to the relevant vehicle type.



Remove stud bolts (1).

Set bore holes \varnothing 4 mm at the positions of the removed stud bolts.

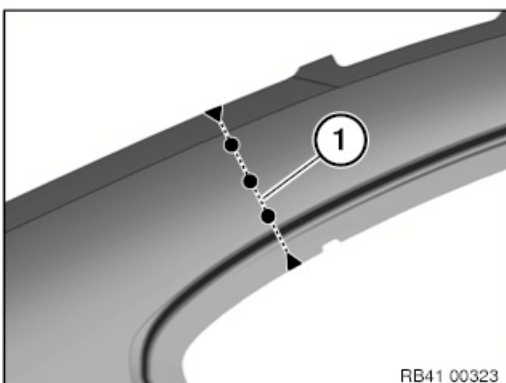
If applicable, place additional bore holes in the area of the edges.



Insert the template (1) into the new part (in direction of arrow) until it is flush (without gap).

Carry over the positions of the holes (2) to the new part.

Remove reinforcement plate again.



Connect marks (positions of holes) to the separating cut line (1).

Carry out the separating cut.

Tear and separate the separating cut on the vehicle according to the new part.



41 00 ... **Setting blind rivet nuts and bolts**

- Studs welded as standard are always replaced by blind rivet bolts.
- Drill holes (0.2 mm larger than the outside diameter of the blind rivet nuts or blind rivet bolts).
- Blind rivet nuts and studs must have a special coating for anti-corrosion purposes (sourcing reference: BMW Parts Department).

Use the blind rivet nuts and bolts supplied in the case of the manual riveting tool for steel only!

- It will no longer be possible to set a blind rivet nut if the drilled hole is too big. In this event, set a clip nut (sourcing reference: BMW Parts Department). This nut tightens itself automatically when screwed to the component.
- Insert blind rivet nuts or bolts and tighten down with rivet tool .
- Seal blind rivet nuts and blind rivet bolts with sealantD1 (risk of corrosion).



41 00 ... Soldering steel components

Attention!

Comply with the following topics from "Body, General":

Safety regulations.

Handling electrical system, electronics, airbags and restraint systems.

1. General information

- For repair cases the following procedure will be implemented:
 - Autogenous brazing solder
- The MIG soldering procedure is not used in repairs for strength reasons. MIG soldered/brazed seams used in standard production are replaced in repairs by MAG weld seams.
- Brazed areas from vehicle production are bonded following the same procedure.

2. Work materials

- Tube pack and torch (autogenous torch)
- Brazing solder
- Gas bottles (oxygen and acetylene)
- Welding goggles

3. Preparation

- Remove the paint and zinc layer in an area of approx. 30 mm around the seam to be soldered.

4. Implementation

- Execute brazed seam without overheating the solder and with low heat dissipation. If necessary, use heat protecting paste.

5. Subsequent treatment of brazed connections:

- Remove burnt residual zinc completely. Align and grind visible connection faces.
- Remove burnt paint with a stainless steel wire brush.

6. Notes on melting/tinning:

Only applicable within the European Union!

The European End-of-life Vehicles Act prohibits the use of leaded tin in vehicles introduced after 01.07.2003!

Even out unevenness smaller than 2 mm with filler according to painting handbook.

Only perform in visible areas of the outer skin and on the carrier support.

All areas which have covers on the vehicle are not to be processed.



41 00 ... Spot-weld bonding steel components

Important!

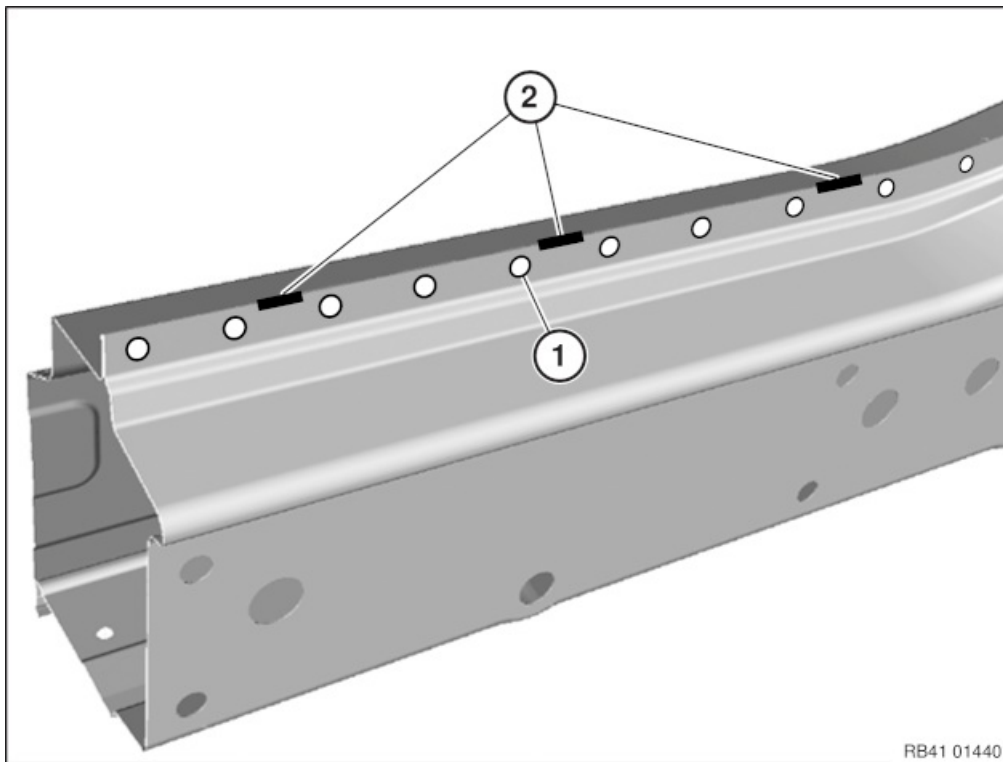
Comply with the following topics from "Body, General":

Safety regulations .

Handling electrical system, electronics, airbags and restraint systems.

Welding steel components.

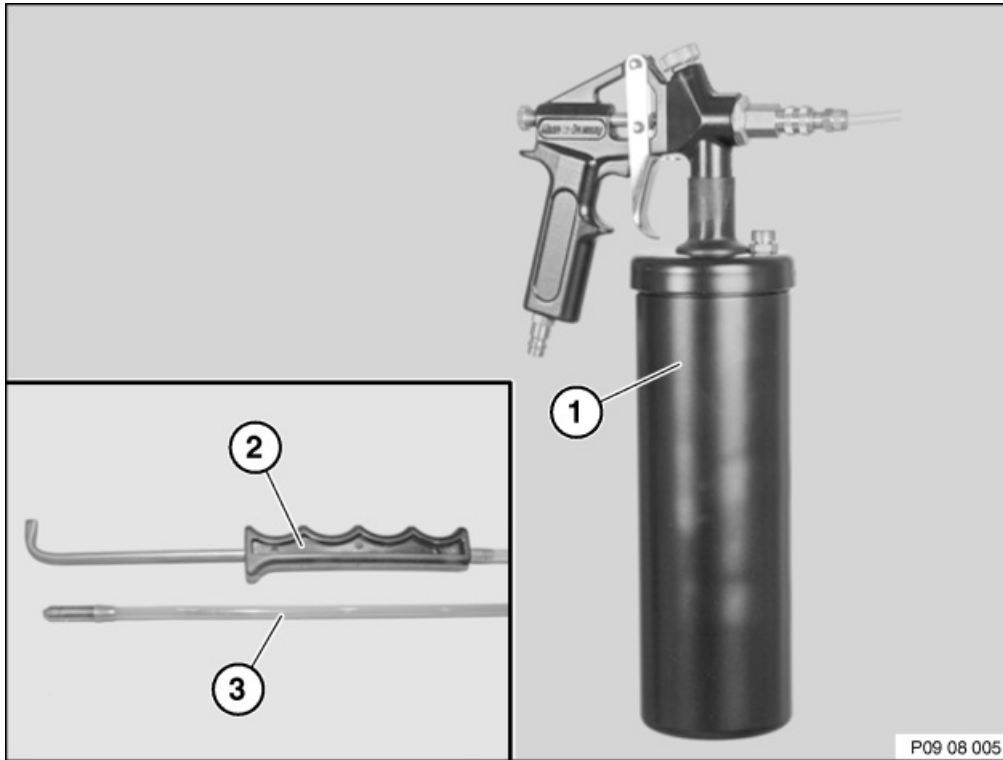
- Beginning with E65 the spot-weld bonding process is used to increase vehicle rigidity. In partial body areas, a 1-component adhesive is applied to the spot flanges and this is followed by resistance pressure spot welding. The adhesive is hardened only after the paint drying process (at approx. 180 °C).
- In the case of repairs, adhesive is **not** applied to the spot flanges. The number of welding spots is **doubled** as a substitute for the omitted adhesive.
- Minimum distance between welding spots (1) is 25 mm. Important! The minimum distance must not be undershot! If there is not enough space for twice the number of resistance weld points, each non-made resistance weld point must be replaced by a MAG weld seam (2). Length of a MAG weld seam = 20 mm. Set the MAG weld seams at equal intervals distributed on the face.



- The following procedures are used as a substitute for spot-weld bonding:
 - MAG welding (**M**etal **A**ctive **G**as welding)
 - Resistance pressure spot welding (referred to in the following and in the repair instructions as spot welding).
- Adhesive is not applied between the spot flanges on new parts in the case of 2- or multi-sheet joints. Areas which cannot be reached by the spot-welding tongs can be joined by MAG plug welding. The number of welding spots is doubled as a substitute for the omitted adhesive.
- **Exceptions** (e.g.E65) are described in the relevant repair instructions. Apply welding spots to existing welding spots on new part. This is necessary because the adhesive between the spot flanges of the new part acts as an insulator.
- **Caution:** Extract smoke and fumes during welding work.



41 00 ... Spray gun for cavity sealant



1.0 Delivery specification:

- Owner's Handbook
- Pressure reservoir spray gun (1) for cavity sealant
- Spray set, consisting of spray hoses: Angle nozzle (2) and round spray nozzle (3)

Important!

Prior to start-up read and familiarise yourself with the manufacturer's operating and safety instructions.

2.0 Start-up:

- Open the pressure reservoir and insert the cavity sealant in the form of a 1-litre can.
Close the pressure reservoir.
- Connect the spray hose to the quick-release coupling.
- Connect the device to the compressed air supply.
Operating pressure 2-6 bar, max. 8 bar!

3.0 Operating principle:

Note:

Unlike previous devices you can alter the spray pattern on this device with the air volume regulating screw (large knurled screw).

- Twisting the air volume regulating screw in decreases the air volume and thus reduces the formation of material mist.
This facilitates optimum working when preserving open components/surfaces.
- Twisting the air volume regulating screw out increases the air volume and thus increases the formation of material mist. (For closed cavities)
- The trigger has two settings.
1st setting - air discharge only.
2nd setting - air and material discharge.



- After finishing work, press the first setting to clean the spray hose with compressed air.
- Prior to storing, remember to twist the air volume regulating screw closed to reduce the risk of the material drying out.
- Prior to an extended period of non-use (2 weeks and more), clean the gun.
- To ensure that the spray hoses function properly, do not store them coiled up e.g. in the side member area!
Store the spray hoses stretched out.

4.0 Application examples:

- Use the appropriate spray hoses for the different types of cavity and surface.
- Example - doors, lids and hatches:
Spray hose with angle nozzle. Reduce air volume to keep the formation of mist low.
- Example - side members:
Long spray hose with round spray nozzle. The air volume must be increased a little, depending on the type used.
- Basically, keep the formation of mist low to avoid fouling and unpleasant odours.

5.0 Safety instructions:

- Do not inhale spray mist.
- Use in well ventilated rooms only.
- Operating pressure max. 8 bar.



**Special tools required:**

- 83 30 2 239 964
- 41 0 000
- 2 239 964

**Note:**

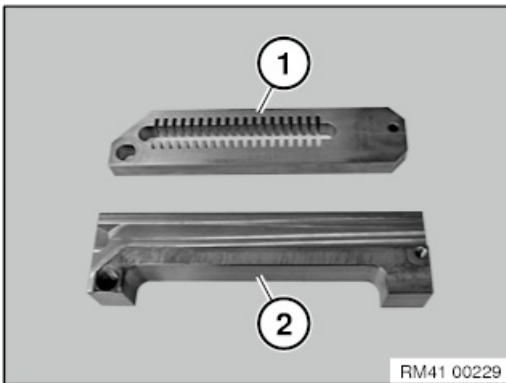
If the stamped vehicle identification number is removed during repair work, it must be stamped in again.

For replacement of wheel arch: Stamp in vehicle identification number prior to installation of wheel arch.

Read and comply with General Notes.

**Necessary preliminary tasks:**

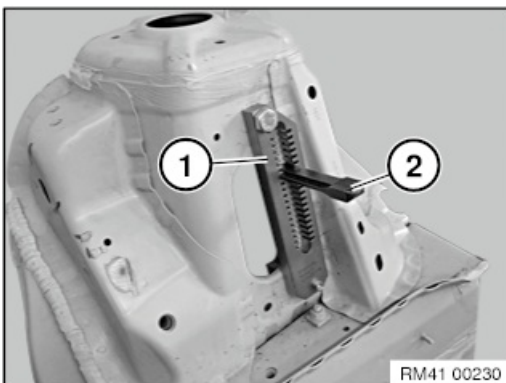
- Remove front right spring strut.
- Remove front right wheel arch cover.
- Remove front right brake line
- If necessary, remove engine



Punching gauge 2 239 964 for stamping the vehicle identification number consists of:

- (1) = Guide plate
- (2) = Counter-support plate
- (3) = Mounting bolts (not shown)

The following special tool is additionally required: Punch numbers 41 0 000 (not shown)

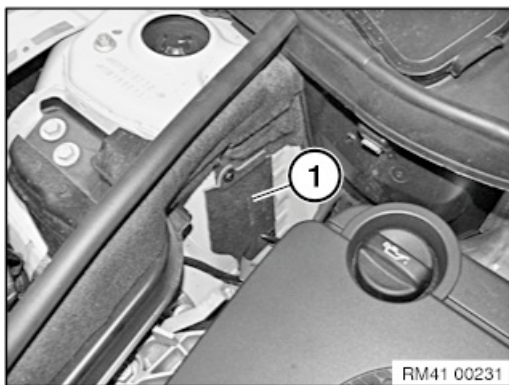


Position counter-support plate on spring strut from bottom.

Position guide plate (1) on spring strut support plate from top and screw to counter-support plate.

Insert punch numbers (2) individually into guide plate and stamp vehicle identification number.





If fitted: Adapt sound insulation (1) to vehicle identification number.



Note:

In the event of component or body replacement by the workshops/garages, clearly delimit the vehicle identification number at front and rear by stamping a "+" in place of the BMW emblem.

Note national regulations.



41 00 ... Straightening aluminium component on the outer skin

1.0 Prerequisites

The component must be replaced if there are cracks and it is neither possible to drill into the end of the crack, nor to weld it.

2.0 Recommended tools

- Only use tools specifically designed for aluminium repairs.
- Do not use tools and operating fluids that have already been used for steel repairs (e. g. grinding wheel). Danger of contact corrosion.
- Do not use any sharp-edged tools (notch effect).
- We recommend the "Alu Slimliner A (6106)" tool to repair minor and moderate body damage. Sourcing reference BMW Workshop Equipment Catalogue.

3.0 Straightening outer skin.

- "Cold" straightening: Press dents out from their centre and smooth in an outwards direction with gentle taps.
In the case of small, soft dents (hail and parking damage), this is also possible without damaging the paintwork. This requires special tools and trained employees.
- "Hot" straightening: Heat the component in the damaged area with a hot air blower to approx. 60 °C. This significantly reduces the force that needs to be applied for straightening.
- Avoid notching and cracking.
- Avoid hardening and overstretching.
- Avoid heating and excess temperature the outer skin over large areas.



41 00 ... Straightening aluminium components in structure

- **Reshaping or heating extruded profiles and cast parts is not permitted!**

Failure to comply with this requirement would have the following results:

In the case of reshaping, weld seams (E52) or bonded connections (E60, E61, E63, E64) tear in the surrounding area.

In the case of reshaping, the material loses up to 40 % of its original strength.

In the case of heating, the material loses up to 40 % of its original strength.

The adhesive is destroyed at temperatures $\geq 120^{\circ}\text{C}$ (E60, E61, E63, E64).

Extruded profiles and cast parts which show visible or measurable signs of deformation must be replaced.

Perform the check for deformation with the aid of the straightening system.

For optical testing, strip adjoining components in cases of doubt.

Extruded profiles are used in the E52 as engine supports, door posts, side members, etc.

Extruded profiles are used in the E60, E61, E63, E64 as engine supports.

Cast parts are used in the E60, E61, E63, E64, E70, E71 as spring supports.

- Reshaping of extruded profiles and cast parts may only be used to achieve optimum joining of connection faces (e.g. when bulkhead is damaged). Reshaped parts must be replaced.

- Repairs which affect the attachment points of mechanical assemblies and chassis/suspension components must be carried out on the straightening bench. Use the vehicle-specific set of attachments set or vehicle-specific data sheet.

Straightening attachment supports and data sheets are also available for the top section, e.g.: door posts, soft top mounts, cowl panel, tailgate hinges, etc.

- Check windscreen and rear window apertures for curvature by inserting the original glass.
- Take the gap dimensions for doors, engine compartment lid and tailgate from the vehicle-specific gap dimension diagram.

- Exceptions on the E60, E61, E63, E64:

Carrier support and bulkhead may be straightened if they do not have any cracks, sharp-edged damage or holes. After repair work, check parts again for cracks.

Examine adjoining adhesive flanges for peeling off. If necessary, seal and preserve with sealant.

Observe the frame reference dimension for the carrier support.

Any repairs to the bulkhead if cracked outside the approved scope of repair work are only permitted after consultation with and approval by BMW. Should you have any questions, please contact the country-specific Hotline.



41 00 ... Straightening steel components in the structure

- High-strength and super-high-strength steel plates as a rule cannot be reshaped. Reshaping only serves as a preparatory measure to replacing the component in order to achieve optimal joining of the connection points.

- Bearing body components such as e.g. engine supports, door pillars, side members etc. with deformations which can no longer be returned to their original shape by "cold straightening" must be replaced.

Heating bearing body components for better reshaping is not permitted!

Failure to comply with this requirement would result in a loss of original strength of up to 40 %.

- **The body must be anchored as follows for reshaping:**

If using vehicle-specific/universal straightening attachment sets (Carbench/ Celette/ Car-O-Liner), it is necessary to secure the body **additionally** with 4 retaining clips to the spot flange of the entrance or to the 4 jacking points. The spot flange (if available) is to be preferred.

If using universal electronic or mechanical straightening systems (Car-O-liner/ Celette), it is necessary to secure the body with 4 retaining clips to the spot flange of the entrance or to the 4 jacking points. The spot flange (if available) is to be preferred. **In addition** anchor at least 2 points with the securing set.

Failure to comply with these instructions will result in damage to the body during reshaping in non-damaged areas. Vehicle-specific straightening attachments and universal mounts may be damaged.

- Repairs affecting the mounting points of assemblies and chassis/suspension components must be carried out on the straightening bench with the matching straightening attachment set or specification sheet for the vehicle.

Straightening attachments and specification sheets are also available for the top section, e.g.: door pillars, convertible top mounts, cowl, rear lid hinges, etc.

- Check windshield and rear window apertures for curvature by inserting the original glass.
- Take the gap dimensions for doors, engine hood and rear lid from the vehicle-specific gap dimension diagram.



41 00 ... **Straightening steel components on the outer skin**

1.0 Recommended tools.

Only use those tools designed for steel repairs (sourcing reference BMW Workshop Equipment Catalogue).

2.0 Straightening outer skin.

- "Cold" straightening: Press dents out from their centre and smooth in an inwards direction with gentle taps. In the case of small, soft dents (hail and parking damage), this is also possible without damaging the paintwork. This requires special tools and trained employees.
- In the event of damage that is only accessible from one side it is possible to use a dent removal system featuring welding.
- Avoid cracking.
- Avoid hardening and overstretching.
- Prevent overheating small areas of the outer skin.
- When the surface exhibits an unevenness no greater than 2 mm after straightening, putty compound can be used to even out the area (see Painting Handbook).
Only applicable within the European Union!
European used-vehicle regulations prohibit the use of tin containing lead in vehicles introduced after 01.07.2003!
- For high-security vehicle, note the special information in the repair instructions!

2.1 Straightening the wheel arch (rear side panel).

Vehicles in which the wheel arch is not welded but bonded and bordered can be straightened.

This is possible in the following situations:

- Rear side panel (wheel arch) is not torn in the area of the bonding. Welding in this area is not permissible.
- The outer skin has not become separated from the outer wheel arch section.

In general, the following applies:

When performing straightening work on the wheel arch, apply sealant to the inside. After straightening, the area must be primed and resealed with sealant D1. Protect from the inside using cavity preservation.



99 00 ... Touching up paintwork damage

These notes apply to paintwork damage on the body aperture that occurred when detaching bonded window glass.

To ensure long-term corrosion protection, it is absolutely essential to touch up damage to paintwork!

The "BMW Color System" painting handbook forms the basis of these repair instructions and must be observed without fail.

Ground down damage to paintwork on body aperture and touch up with BMW multibase filler.

Grind larger areas or damage down to the bare sheet metal and coat with BMW multibase filler (layer thickness 30 to 40 µm).

Hardening time:

- With infrared, at least 10 minutes
- Without infrared for at least 60 °C, at least 30 minutes
- Without infrared for at least 20 °C, at least 24 hours

If a complete build-up of paint is required in the visible area:

- Tape off primed adhesive flange before applying top coat

Important!

Observe hardening time of BMW multibase filler otherwise a perfect bond cannot be guaranteed!





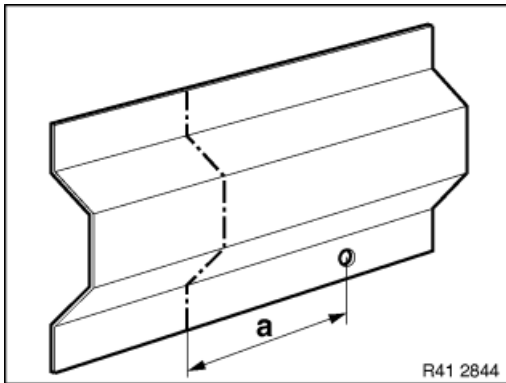
In the case of a partial replacement piece, a body component is cut at a point described in the repair instructions.

A reinforcement plate is welded in to ensure sufficient strength.

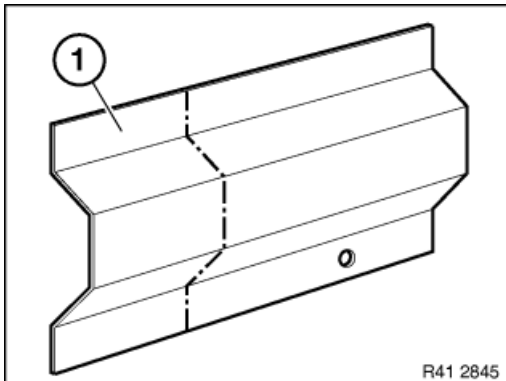
Follow notes for welding steel components.

Note:

The following graphics serve as general illustrations of reinforcement plate repair work. They are applicable to all sectional repairs.

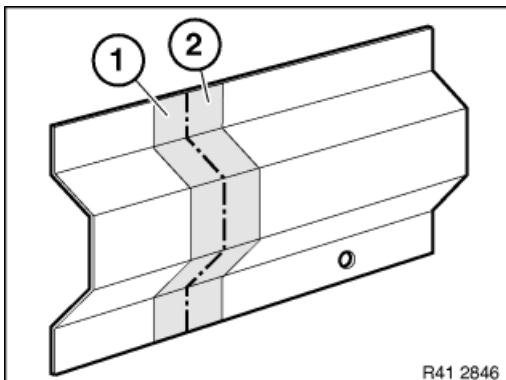


Mark component in accordance with dimension A and cut.



Cut new part (1) in accordance with cut and if necessary adjust to fit with alignment bracket or universal mount. *Installation note:*

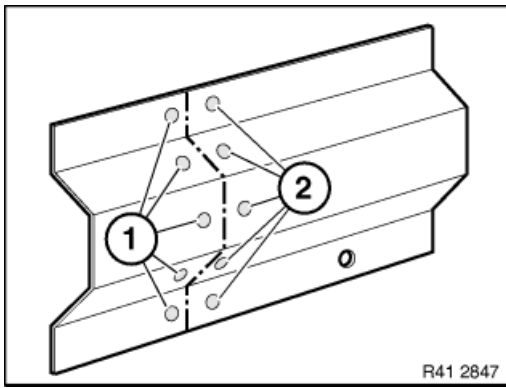
Maintain a distance of approximately one to no more than two material thicknesses at the severance cut to ensure welding with the reinforcement metal and enable more tolerant adjustment.



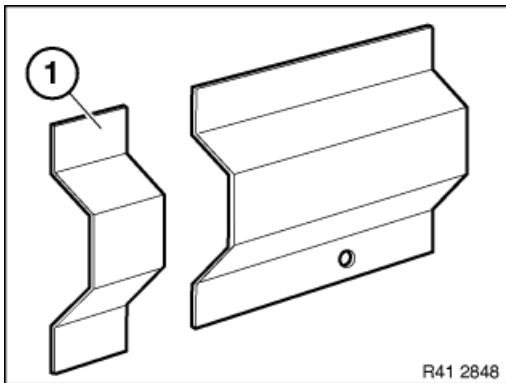
Clean inner and outer sides of connection faces (1) on new part and (2) on body.

Coat insides with welding primer.

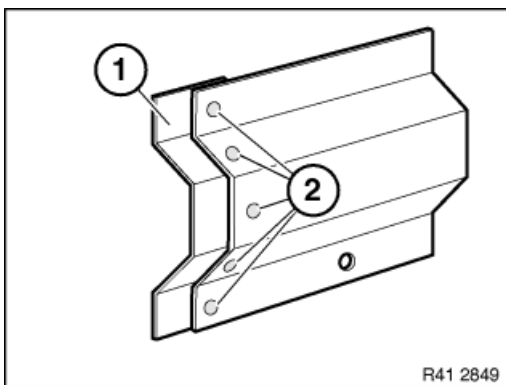




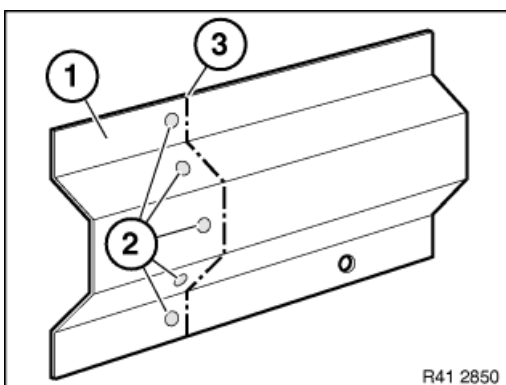
Drill bore holes (1) and (2) at distance of 25 mm to each other.
Hole diameter approx. 8 mm.



Make reinforcement plate (1) from trim of new part.
If applicable, produce more reinforcement plates.
Length of reinforcement plates is min. 40 mm.
Coat reinforcement plates (1) and (2) on both sides with welding primer.



Push reinforcement plate (1) into component on body up to half way
and plug-weld (2).



If applicable, adjust the new part (1) with the alignment bracket or
universal tool and plug-weld (2)
MAG weld the joint (3).
Grind and clean weld seam and plug weld spots.
Only visible areas of the outer skin and on the carrier support must be
tinned.
All areas which have covers on the vehicle are not to be tinned.
Note:
Only applicable within the European Union!
European used-vehicle regulations prohibit the use of tin containing
lead in motor vehicles introduced after 01.07.2003!



41 00 ... Welding steel components

Important!

Comply with the following topics from "Body, General":

Safety regulations.

Handling electrical system, electronics, airbags and restraint systems.

1. General information

- The following procedures are used for repairs:
 - MAG welding (**M**etal **A**ctive **G**as welding)
 - Resistance pressure spot welding (referred to in the following and in the repair instructions as spot welding).
- Take the number and position of welding spots and MAG weld seams from the separated part. Replace areas inaccessible to spot-welding tongs with MAG plug weldings at the same distance. Diameter of bore holes for plug weldings 8 mm.
- In the case of emissions extraction, observe a minimum distance of 30 cm for MAG welding during the welding process. Otherwise the inert gas would be drawn off.
- Follow the equipment manufacturer's instructions for use.

2. Work materials

- MAG welding:
 - Steel welder (see Workshop Equipment).
 - Steel welding wire - G3SI1 (SG2) or alternatively G4SI1 (SG3)
 - Welding mask
 - Gas bottle containing inert gas (82 % argon, 18 % CO₂)
- Resistance pressure spot welding:
 - Spot-welding apparatus (see Workshop Equipment).
 - Safety goggles

3. Preparations for MAG and spot-welding

- Remove the paint coating in an area of approx. 30 mm around the weld seam or spot.
 - The zinc layer underneath must be removed during the MAG welding method.
 - It is not necessary to remove the zinc layer underneath during spot-welding.
- Remove the paint coating on the reverse side of the weld seam or spot.
 - Contaminants will otherwise enter the weld pool via the root of the weld seam.
 - An insufficient electron flow prevents an optimum spot-weld joint.
- Coat all metal overlaps and weld spot flanges with welding primer.
- To determine the optimum electrode contact force for spot-welding, carry out spot-weld shear tests on sample sheet metal.
- In order to keep the electron flow short during MAG welding on the body, you must if possible attach the ground terminal directly to the component to be welded.

4. Welding

- During MAG welding, the weld gap must be kept as small as possible. The larger the weld gap, the lower will be the strength of the joint.
- During spot-welding, the sheet metal flanges to be joined must be placed as close together as possible without gaps.
The larger the gap, the lower will be the strength of the joint.
Minimum distance between welding spots 25 mm.

5. Subsequent treatment of welded connections:

- When grinding a weld seam, do not grind thin the base material next to the seam.



- After joining, clean all weld seams and spots with a stainless steel wire brush.
- Remove burnt paint with a stainless steel wire brush.
- All welded connections sealed off with body sealing compound in original condition must be primed and sealed off again thoroughly after repairing. Replace damaged or removed anti-drumming layers.



41 00 ... Working with 2-component PU cavity foam

Sourcing reference for cavity foam, refer to BMW Parts Service.

Properties of cavity foam:

- 2-component PU foam, solvent-free.
- Excellent flow capacity, enabling complete sealing of cavities.
- Good strength, preventing slipping in cavities.
- Low water absorption, preventing corrosion.
- Ideal for use as insulating and sealing compound

Information on dangers/hazards:

- Avoid eye and skin contact.
Wear protective goggles, solvent-resistant protective gloves and protective clothing.
- Do not inhale.
Apply in well ventilated rooms only.
- **Warning!**
Application time after mixing: within **8 minutes!**
Completely empty open can after use.
- Remaining amounts which are not used can cause the **can to explode** on account of a chemical reaction (buildup of heat)!
Alternatively, cool the can containing the non-removed remaining amount for several hours in cold water.
- Do not eat, drink or smoke during this operation.
- Keep heat and ignition sources well away.
- Read the manufacturer's information on hazards/dangers (printed on the can) prior to application.

Application instructions:

- Use by date on can.
Do not use the spray can after the Use by date on the can has expired. After the Use by date the properties of the cavity foam will no longer meet the requirements of the BMW Group.
- Cavity sealing of repair area possible after an air drying time of 1 hour.
- Backing surface must be
clean and free from
dust,
grease,
oil and stripping agent.
- Application temperature at least 15 °C. Optimally 20 °C.
- Remove fresh, non-hardened PU foam with adhesive cleaner 208.
Sourcing reference: BMW Parts Service.
Hardened PU foam can only be removed by mechanical means (machine).
- Excess, hardened PU foam can be disposed of as residual waste.
Cans which are not entirely empty and unused whose Use by date has expired are classed as hazardous waste.
Observe country-specific waste-disposal regulations.
- Observe the manufacturer's application instructions (printed on the can).
- Important!
Foam expands many times over as it sets (change in volume).
- Setting takes approx. 30 minutes. Mechanical processing (e.g. drilling, cutting, etc.) is then possible.



41 00 ... Workshop equipment (BMW and MINI vehicles)

Minimum requirements for workshop equipment to guarantee professional body repairs:

The tools listed below **must be used**.

Repair stage 1a:

Tool*	Sourcing reference	Screwed parts (steel or plastic)	Screwed parts (aluminium)
Body tool trolley	81 64 2 153 204 or 81 64 2 410 578	x	x
Drill	conventional Span width 0 to min. 10 mm	x	x
Blind riveting tongs	81 43 0 301 744	x	x
Manual riveting machine for blind rivet nuts	81 43 2 155 739 (up to M12) or 81 43 9 429 204 (up to M8)	x	x

Repair stage 1b:

Tool*	Sourcing reference	Screwed parts (steel or plastic)	Screwed parts (aluminium)
Aluminium bodywork tool assortment	81642336755		x
Pressure cup spray gun for cavity preservation	81452148795	x	x
Drill	conventional Span width 0 to min. 10 mm	x	x
Blind riveting tongs Electrical or pneumatic With rivet head extension	81430301744 with extension 81432158706 or 81432159003	x	x
Manual riveting machine for blind rivet nuts	81432155739 (up to M12) or 81439429204 (up to M8)	x	x

Repair stage 2:

Tool*	Sourcing reference	Steel		Aluminium	
		Structure	Outer skin	Structure	Outer skin
Body tool trolley accessory set	81642334947	x	x		
Bodywork saw	81432156415 or 81432410594	x	x		
Belt sander	81432236488 (230V) or 81432333873 (100-115V)	x	x	x	x
Single-handed grinder	81430303336	x	x	x	x
Welding spot remover	81439428600	x	x		



Punch riveting tool	8132158708	x	x	x	
MAG welding apparatus	conventional	x	x		
Cartridge gun for adhesives		x	x	x	x
Infrared heater	81442211107 (220V) or 81452211615 (110V)		x		
Thermometer	81312211265		x		

In addition, the repair stage 1 tools are required.

Repair stage 3:

Tool*	Steel		Aluminium	
	Structure	Outer skin	Structure	Outer skin
Spot welding apparatus	x	x		
Straightening system	x		x	
Stud welding apparatus	x		x	
Flame coating set			x	
MIG welding apparatus			x (E52 only)	

In addition, the repair stage 1 and 2 tools are required.

*Sourcing reference BMW Workshop Equipment Catalogue

Attention!

In vehicles from model year 2001, higher-tensile and high-tensile steels are used in certain areas.

It is essential to check whether the spot-welding apparatus used conforms to the technical requirements of the currently recommended welding sets. Should you have any questions, please contact the country-specific Hotline.

The use of technically obsolete equipment may have serious consequences for the structure of the vehicle (e.g. in the event of an accident). In the end, this can result in safety and product liability risks which cannot be calculated.

Use and restrictions:

Definition of recommendation:

All currently recommended spot welding sets comply according to the *latest* information with the requirements relating to reliable welding of today's and future BMW Group vehicles. A spot welding unit will lose its recommendation as soon as tests with materials and material combinations designated for future use in BMW Group vehicles return negative results (see Table Group 1). All previous application before the withdrawal of the recommendation shall remain unaffected.

	Device designation	Manufacturer
Group 1	CR500	CAR-O-LINER
Devices currently <i>no</i> longer recommended	Spot9000	Tecna
	ATL 400V	Wieländer&Schill
	MIDIsport QSVM12000T	CAR-O-LINER
	MIDIsport QSVM12000T	Elmatech
	MIDIsport QSVM9000	CELETTE
	MIDIsport QSVM9000	Elmatech



	CR600 QSM	CAR-O-LINER
Group 2 Devices currently <i>recommended</i>	Multispot MI-100 Control	Elektron
	Inverta Spot GT BM	Wieländer&Schill
	3664 BM	Tecna
	CTR12000T	CAR-O-LINER

Application options and restrictions of above devices.

Vehicle	Group 1	Group 2
All BMW convertibles from E64	x Except A-pillar, B-pillar, sill	x
All BMW model ranges from E70	x Except B-pillar	x

Note:

As at May 2016

All BMW and MINI vehicles not mentioned can be repaired with the equipment of Group 1 and Group 2.



41 ... 0 Notes on the repair technique used in the main group 41

Two different repair techniques are used in body repair.

These are welding and bonding/riveting.

If the repair instructions do not specify a repair technique, then welding must **always** be used.

The bonding/riveting repair technique is **always** described in detail in the repair instructions.

Quality standards must be met.





Read contents of Body, General.

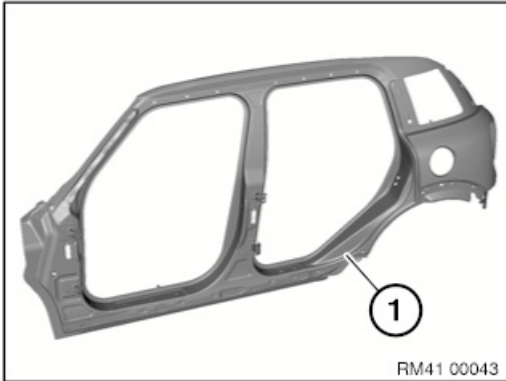
Procedure Observe repair stage 3!

For stripping and rigging operations, refer to texts on KSD CD (job number 41 21 201).

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Use only approved spot-welding apparatus for repairs.

Place vehicle on straightening bench.

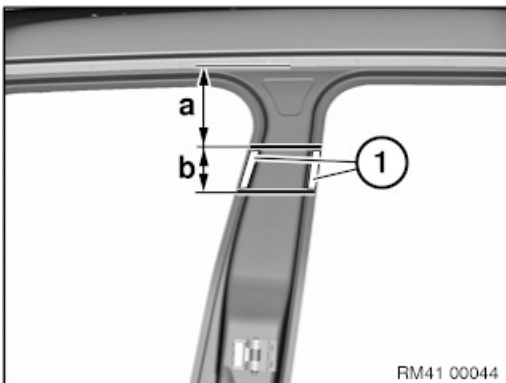


The following new body parts are required (refer to Electronic Parts Catalogue):

- (1) Side frame, outer
- (2) opening separation B-pillar bottom inside.



Removal of B-pillar with reinforcement



Mark severance cuts in accordance with specified dimensions and cut.

Important!

Cut outer panel only for following severance cuts.

Dimension a = approx. 150 mm from component edge of roof outer skin.

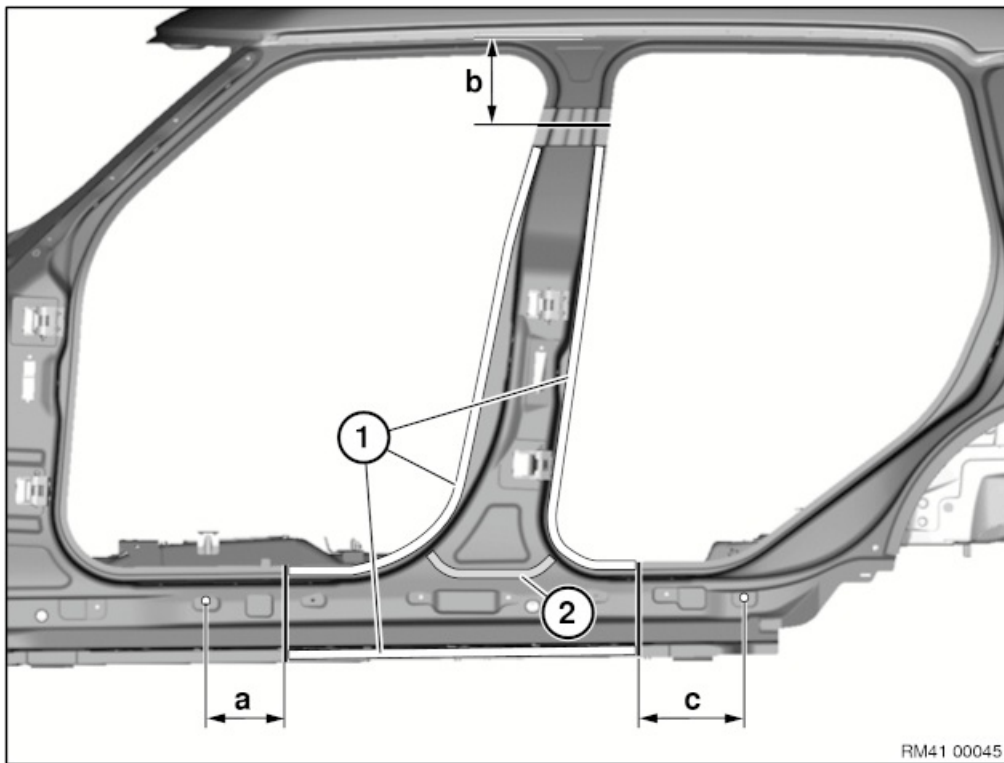
Dimension b = approx. 100 mm below cut a.

Open welded connections in area (1).

Note:

Cut out metal section is needed again for sealing.





Mark severance cuts in accordance with specified dimensions and cut.

Important!

Cut outer panel only for following severance cuts.

Dimension a = approx. 160 mm from centre point of 8 mm dia. hole.

Dimension b = approx. 200 mm from component edge of roof outer skin.

Dimension c = approx. 200 mm before centre point of hole dia. 8 mm.

Open welded connections in areas (1).

Release B-pillar from cavity sealing (2) and remove



New part preparation

Mark severance cuts on new part in accordance with severance cuts on vehicle and cut.

Prepare reinforcement plates at severance cuts.

Adjust new parts to fit with alignment bracket or universal mounting.



Installation of B-pillar with reinforcement

Apply sealant to cavity sealing.

Install new parts and reinforcement plates with alignment bracket or universal mount and weld.



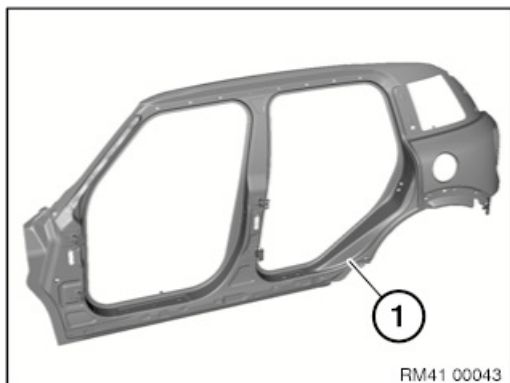
41 11 311 Replace entrance for front left door.



Observe procedure for repair stage 3.

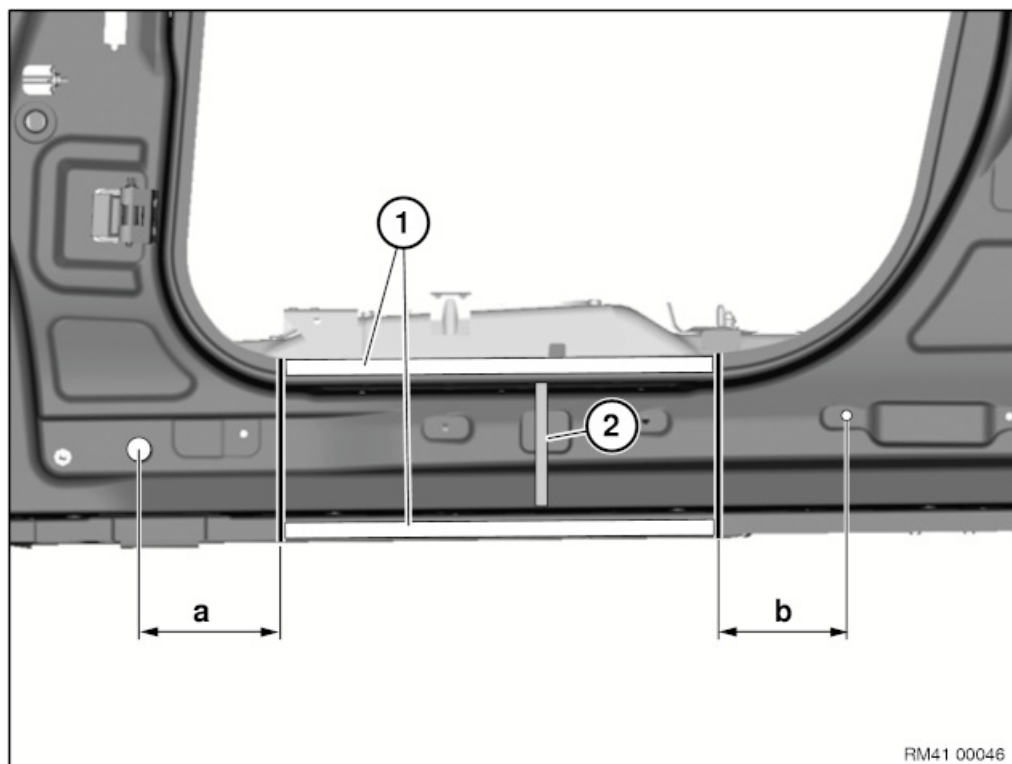
Read contents of Body, General.

For stripping and rigging operations, refer to texts on KSD CD (job number 41 11 311).



Following new body parts are required (refer to Electronic Parts Catalogue):

- (1) B-pillar with entrance



Mark severance cuts in accordance with specified dimensions and cut.

Important!

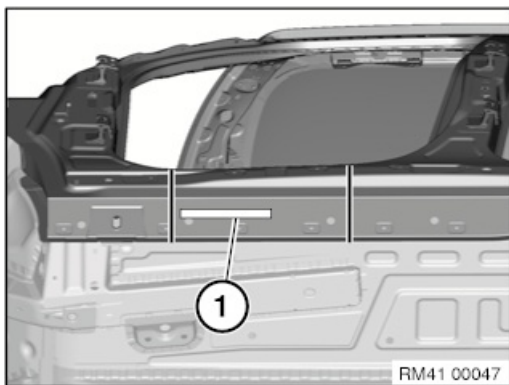
Cut outer panel only for following severance cuts.

Dimension a = approx. 150 mm behind 20 mm dia. hole.

Dimension b = approx. 130 mm before 8 mm dia. hole.

Open welded connections in areas (1) and (2).





View from below.

Open welded connections in area (1).

Remove the entrance section.

Installation note:

Mark new part in accordance with severance cuts on vehicle and cut.

Separate welded connections on new part to match vehicle.

Weld in reinforcement plates at all severance cuts.





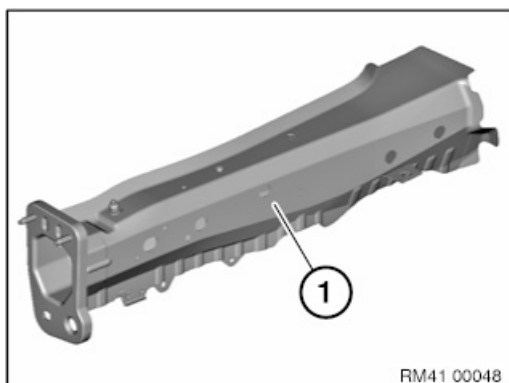
Read contents of Body, General.

For stripping and rigging operations, refer to texts on KSD CD (job number 41 11 082).

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Use only approved spot-welding apparatus for repairs.

Place vehicle on straightening bench.

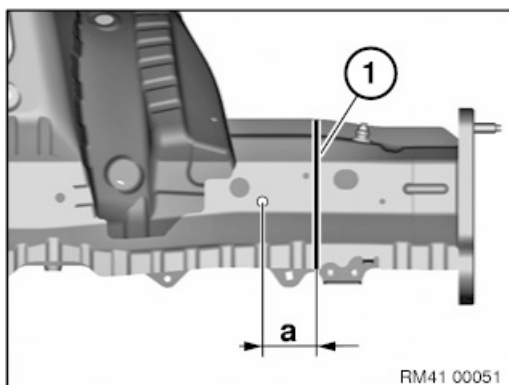


The following new body parts are required (refer to Electronic Parts Catalogue):

- (1) Engine support, front

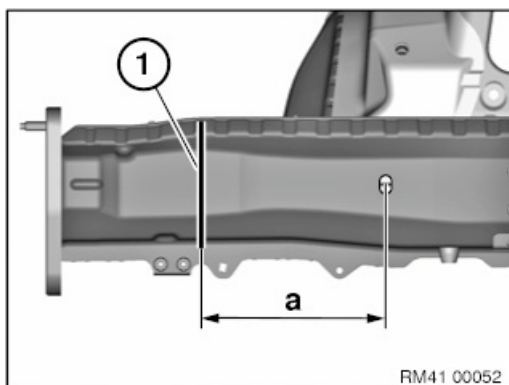


Removal of engine support



Outer side:

Mark severance cut (1) in accordance with specified dimension and cut.
Dimension a=55 mm before 10 mm dia. hole.



Inside:

Mark severance cut (1) in accordance with specified dimension and cut.
Dimension a=190 mm before 12 x 16 mm dia. hole.





New part preparation

Mark severance cuts on the new part according to vehicle and cut.

Prepare reinforcement plates at severance cuts.

Adjust new parts to fit with alignment bracket or universal mounting.



Installation of engine support with wheel arch

Install new parts and reinforcement plates with alignment bracket or universal mount and weld.





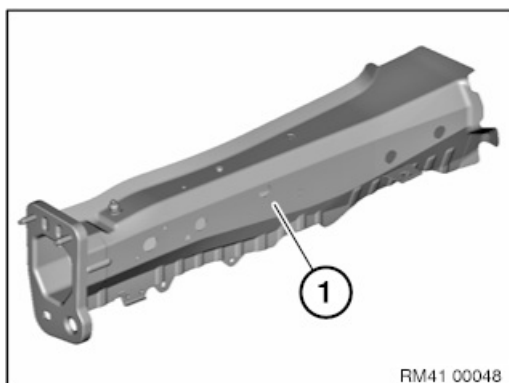
Read contents of Body, General.

For stripping and rigging operations, refer to texts on KSD CD (job number 41 11 081).

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Use only approved spot-welding apparatus for repairs.

Place vehicle on straightening bench.

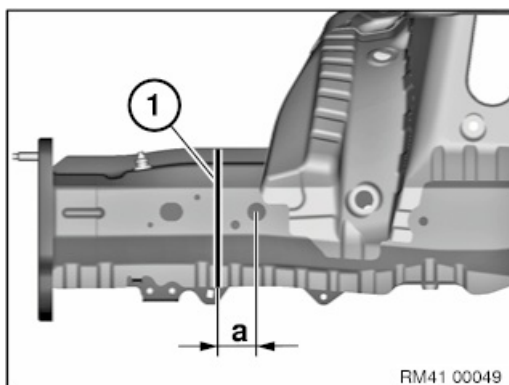


The following new body parts are required (refer to Electronic Parts Catalogue):

- (1) Engine support, front



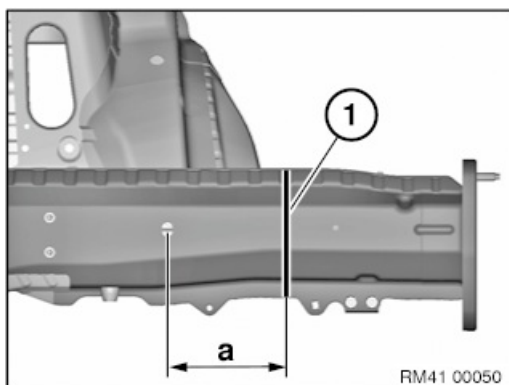
Removal of engine support



Outer side:

Mark severance cut (1) in accordance with specified dimension and cut.

Dimension a=40 mm before 20 mm dia. bore.



Inside:

Mark severance cut (1) in accordance with specified dimension and cut.

Dimension a=135 mm before 16 x 12 mm dia. bore.





New part preparation

Mark severance cuts on the new part according to vehicle and cut.

Prepare reinforcement plates at severance cuts.

Adjust new parts to fit with alignment bracket or universal mounting.



Installation of engine support with wheel arch

Install new parts and reinforcement plates with alignment bracket or universal mount and weld.



Replacing engine support with left wheel arch in front of



Read contents of Body, General.

Observe procedure of repair stage 3.

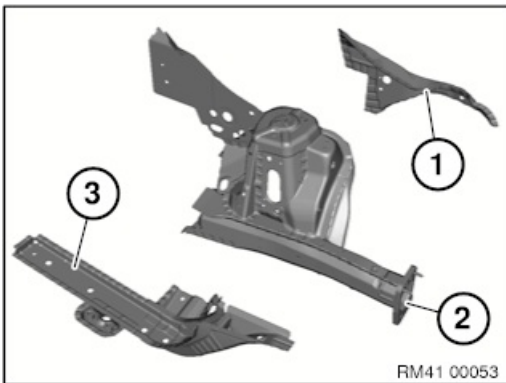
For stripping and rigging operations, refer to texts on KSD CD (job number 41 11 071).

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Spot-weld bonding is used on this vehicle. Observe specific procedure.

Use only approved spot-welding apparatus for repairs.

Place vehicle on straightening bench.

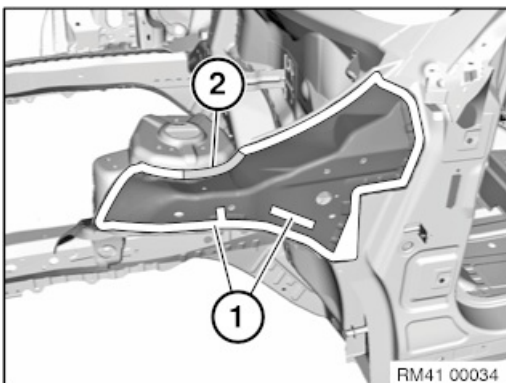


The following new body parts are required (refer to Electronic Parts Catalogue):

- (1) Carrier support, wheel arch, outer
- (2) Wheel arch, front
- (3) Engine support, rear



Removal of engine support with wheel arch

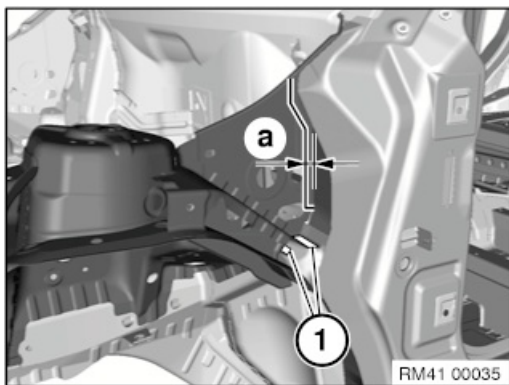


Open welded connections in areas (1).

Open spot-welded adhesive joints in area (2).

Remove the carrier support for wheel arch.





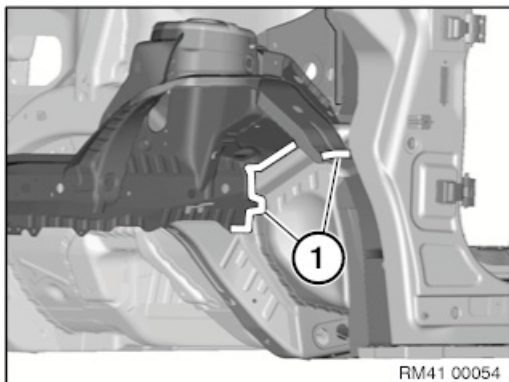
Mark severance cut in accordance with dimension and cut.

Dimension a = 20 mm from A-pillar component.

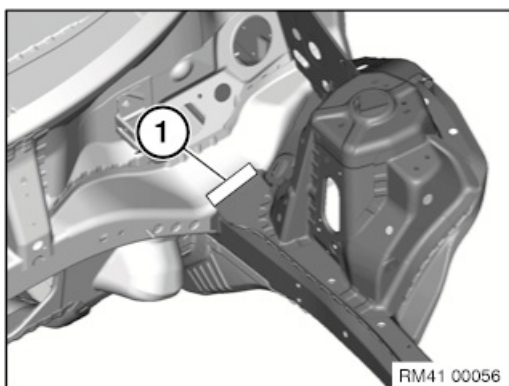
Open welded connections in areas (1).

Installation note:

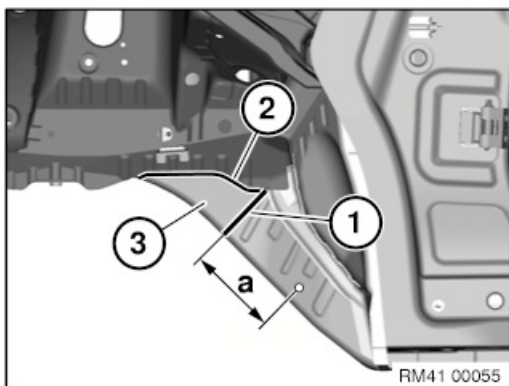
Weld on new part, overlapping severance cut connection face.



Open welded connections in areas (1).



Open welded connections in area (1).



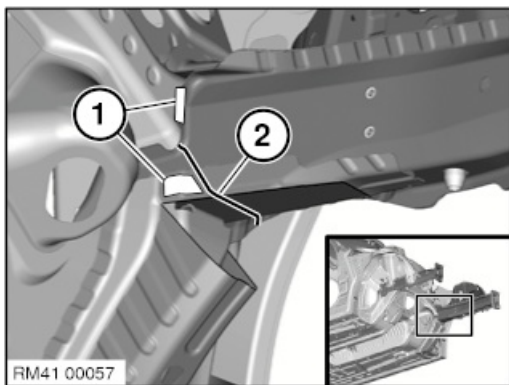
Mark severance cut (1) in accordance with dimension and cut.

Dimension a = approx. 135 mm from centre of 10 mm dia. hole.

Mark severance cut (2) as pictured and cut.

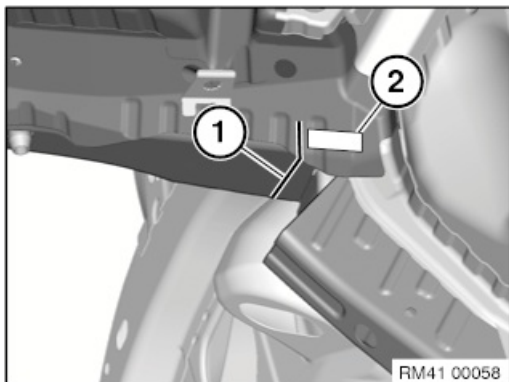
Remove section (3).





Open welded connections in areas (1).

Mark severance cut (2) on engine support as pictured and cut.



Outer side of engine support.

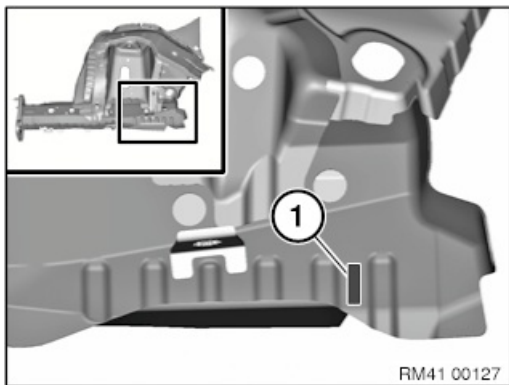
Mark severance cut (1) as pictured and cut.

Open welded connections in area (2).

Remove engine support with wheel arch.

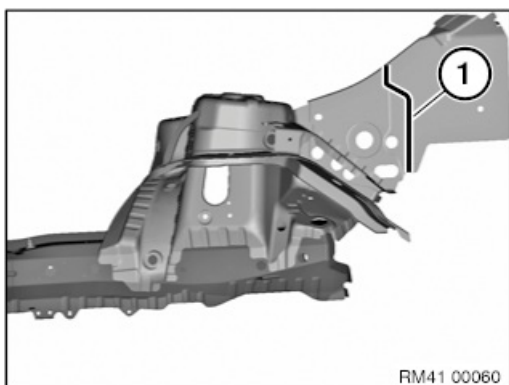


New part preparation



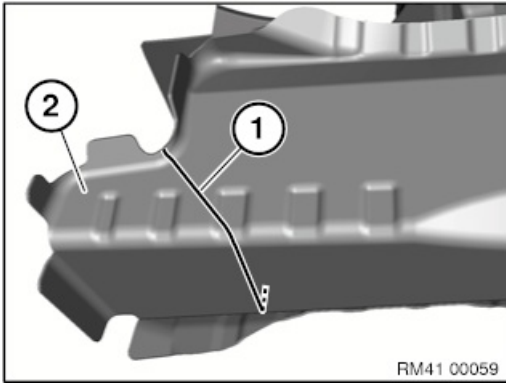
Grind a V-shaped groove (1) into engine support. *Note:*

In area (1), all 3 panels and the reinforcement plate must be properly MAG welded to each other.

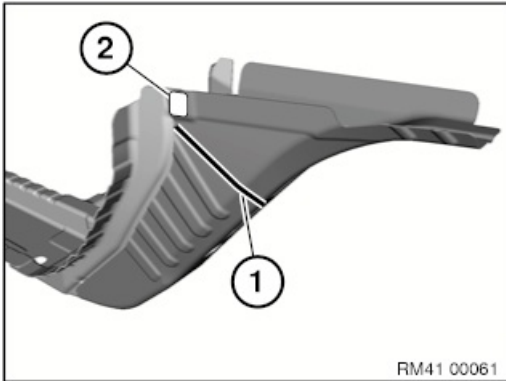


Mark severance cut on new wheel arch part in accordance with severance cut on vehicle +20 mm extra material and cut (1). *Note:* New part is installed with overlap in area of severance cut (1).

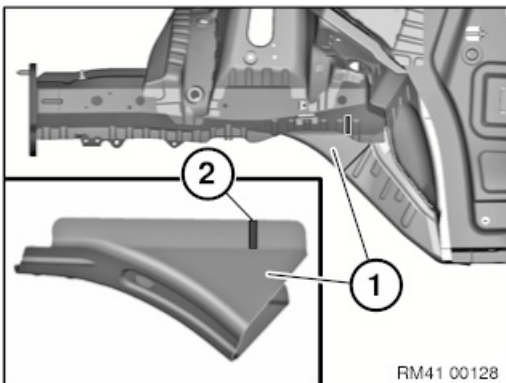




Mark severance cut (1) in accordance with vehicle and cut.
Remove metal section (2).



Mark severance cut (1) on new engine support part in accordance with severance cut on vehicle and cut (1).
Release welded connection (2) and take off engine support section.

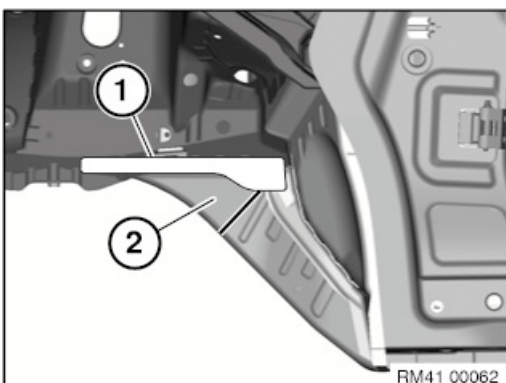


Grind a V-shaped groove (2) into the engine support section (1).
Determine the correct position of the groove by fitting the section into the new wheel arch part.
Prepare reinforcement plates at severance cuts.
Adjust new parts to fit with alignment bracket or universal mounting.



Installation of engine support with wheel arch

Install new parts and reinforcement plates with alignment bracket or universal mount and weld.



Note:

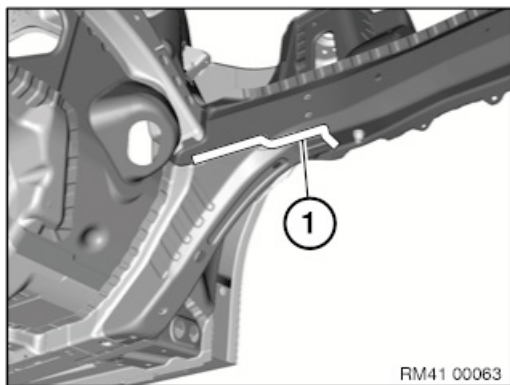
Only weld new parts in area (1) after installation of engine support section (2).

Additionally weld new parts in area (1) using plug welding method.

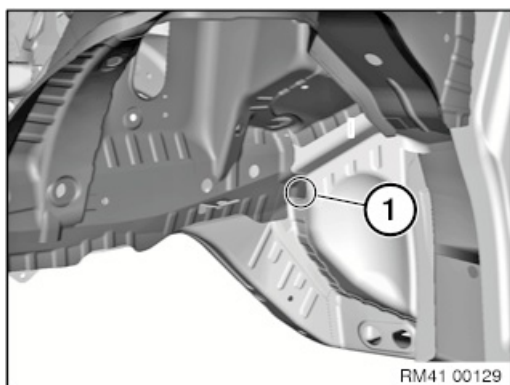
Note:

In area (1), all 3 panels and the reinforcement plate must be properly MAG welded to each other.





Additionally weld new parts in area (1) using plug welding method.



In area (1) drill 1 Ø 6.8 mm hole for blind rivet.

Important!

Risk of damage!

Do not drill through add-on parts in passenger compartment behind panel.

Rivet new engine support part in area (1) with blind rivet N1.



41 11 751

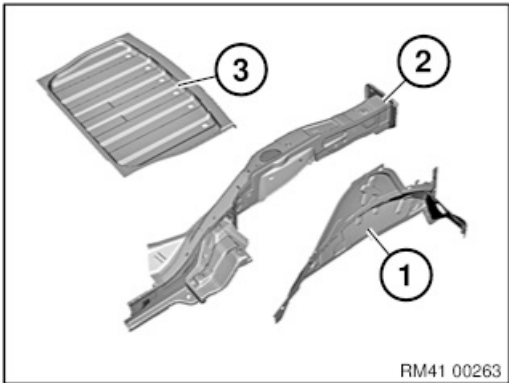
Replacing luggage compartment floor and side member on left
(left side wall and tail panel removed)



Read contents of Body, General.
Strip down vehicle
Spot-weld bonding is used on this vehicle. Observe specific procedure.
Place vehicle on straightening bench.



Follow procedure for repair stage 3.



Following new body parts are required (see Electronic Parts Catalogue):

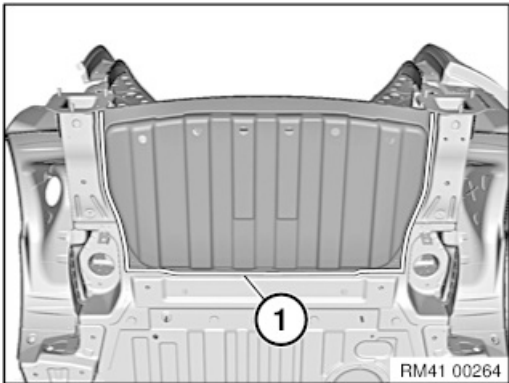
- (1) Wheel arch, rear, inner half, left
- (2) Frame side member, left rear
- (3) Luggage compartment floor, rear

Following consumables are required:

Material	Quantity
Adhesive K5a	2
Blind rivets N6	16
EMC screws	4
Cleaning agent R1	1
Sealant D1	

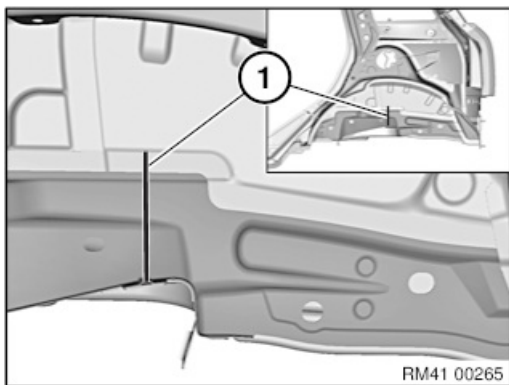


Removal

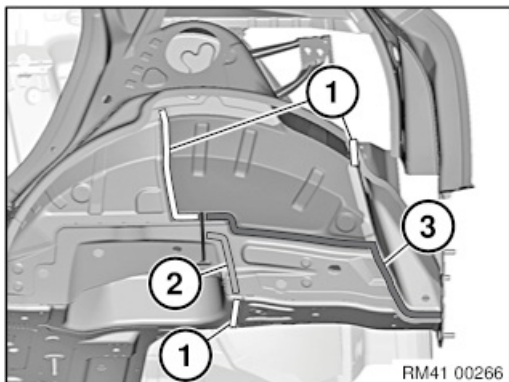


View from below.
Open spot-welded adhesive joints in area (1)
Remove the luggage compartment floor.

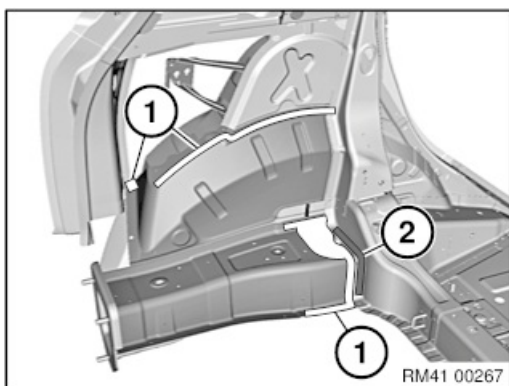




Mark severance cut (1) as pictured and cut. **Important!**
Cut outer panel only.



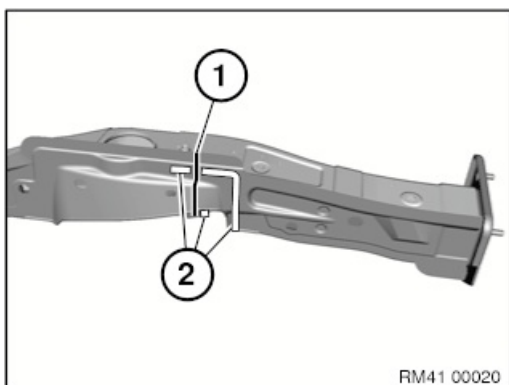
Open welded connections in areas (1).
Open spot-welded adhesive joints in area (2)
Installation note:
Weld new components in area (3) additionally.



Open welded connections in areas (1) and (2).
Remove side member and wheel arch.



New part preparation

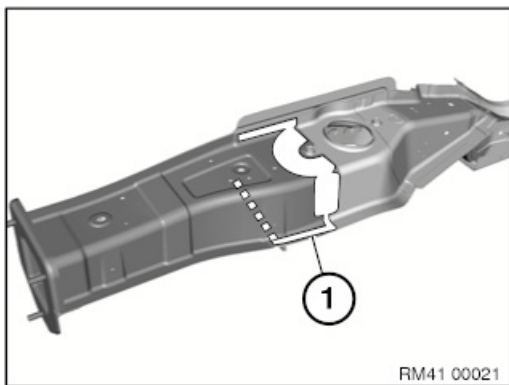


Mark severance cut (1) in accordance with severance cut on vehicle and cut.

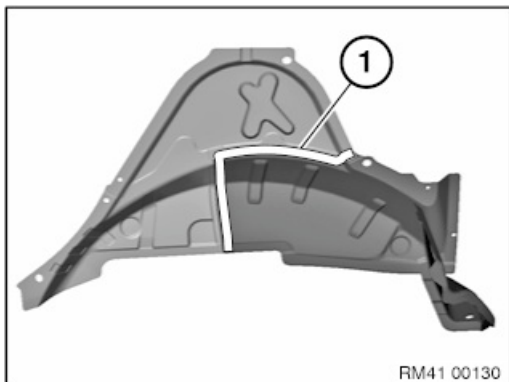
Important!
Cut outer panel only.

Open welded connections in areas (2).

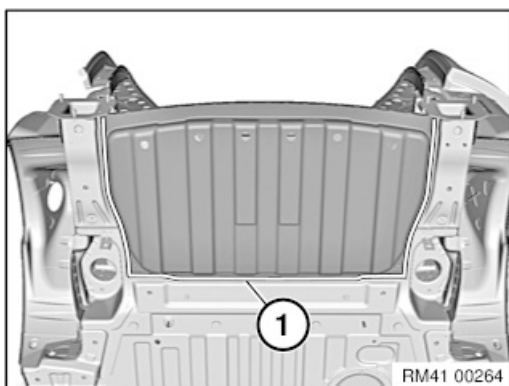




Open welded connections in areas (1).
Remove components not needed.



Open welded connections in area (1).
Remove components not needed.
Adjust new parts to fit with alignment bracket or universal mount and secure.



Fit luggage compartment floor from underneath and adjust in conjunction with tail panel and secure.
Set 16 4.2 mm dia. bore holes for blind rivets in area (1).
Remove new part and deburr holes.



Important!

Do not grind new part for the luggage compartment floor and body in area of bonding surfaces!



Installing side members and wheel arch

Install new parts with alignment bracket or universal mount and weld.

- Side member, rear left
- Wheel arch, rear, inner half



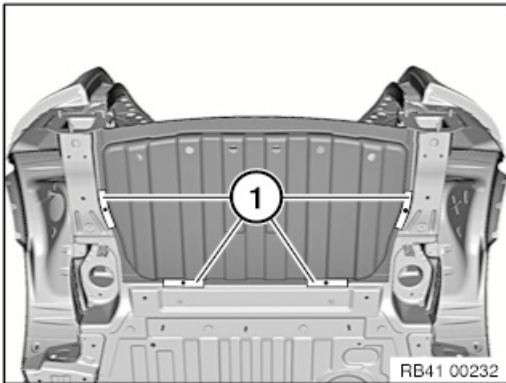


Installation of luggage compartment floor

Clean all bonding surfaces with cleaning agent R1.

Apply adhesive to bonding surfaces.

Install the luggage compartment floor and rivet with blind rivets.



After hardening of the adhesive, install 4 EMC screws in the areas (1).



41 11 751 Stripping operations - Replace the left side member and luggage compartment floor (removed left side wall and tail panel)

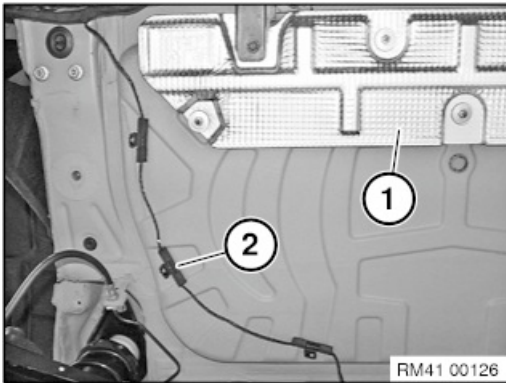


Note:

Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

- Remove rear left wheel arch cover (job number: 51 71 041)
- Detach the brake hose from the left brake pipe (job number: 03 34 006)
- Remove rear axle support (job number: 33 31 000)
- Remove the left rear spring strut shock absorber (job number: 33 52 100)



Remove heat shield (1).

Release wiring harness (2) from luggage compartment floor.



41 11 751 Stripping operations - replace the left side member and luggage compartment floor, all-wheel drive vehicle (removed left side wall and tail panel)



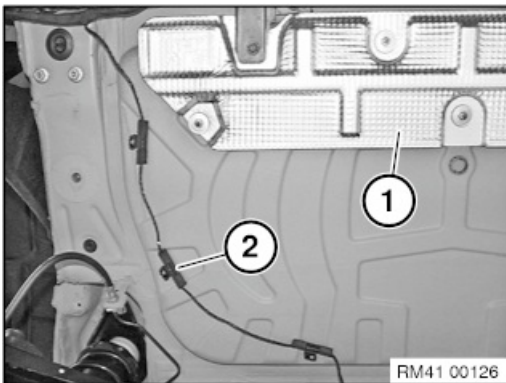
Note:

Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

Vehicles with four-wheel drive

- Remove rear left wheel arch cover (job number: 51 71 041)
- Detach the brake hose from the left brake pipe (job number: 03 34 006)
- Detach propeller shaft from rear axle final drive (job number: 26 11 000)
- Remove rear axle final drive (job number: 33 10 016)
- Remove the rear axle support (all wheel drive vehicle) (job number: 33 31 000)
- Remove the left rear spring strut shock absorber (job number: 33 52 100)



Remove heat shield (1).

Release wiring harness (2) from luggage compartment floor.



41 ... 0 Notes on the repair technique used in the main group 41

Two different repair techniques are used in body repair.

These are welding and bonding/riveting.

If the repair instructions do not specify a repair technique, then welding must **always** be used.

The bonding/riveting repair technique is **always** described in detail in the repair instructions.

Quality standards must be met.



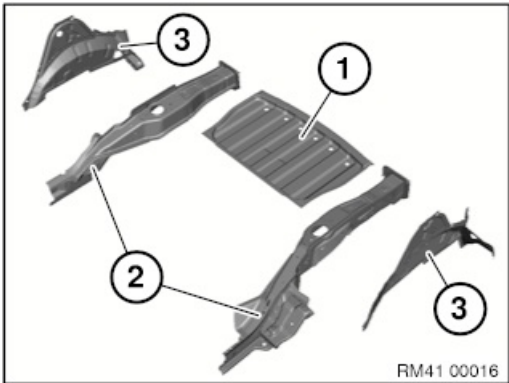
41 12 535 Replacing luggage compartment floor and both side members (tail panel removed)



Read contents of Body, General.
Strip down vehicle
Spot-weld bonding is used on this vehicle. Observe specific procedure.
Place vehicle on straightening bench.



Observe procedure for (repair stage 3)!



Following new body parts are required (see Electronic Parts Catalogue):

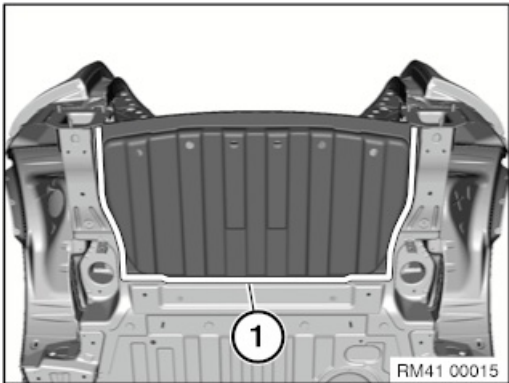
- (1) Luggage compartment floor, rear
- (2) Side member, rear left and right
- (3) Rear wheel arch, inner half, left and right

Following consumables are required:

Material	Quantity
Adhesive K5a	2
Blind rivets N6	16
EMC screws	4
Cleaning agent R1	1
Sealant D1	

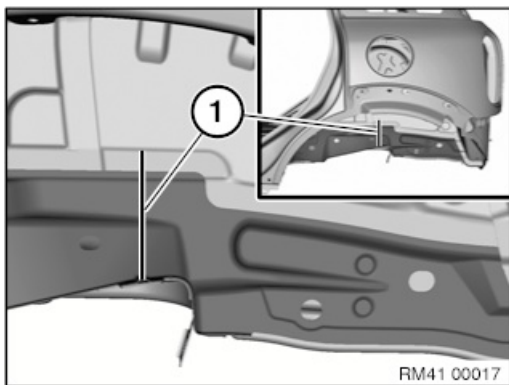


Removal of luggage compartment floor and both side members
Most of operation is described on the left side. Right side identical.

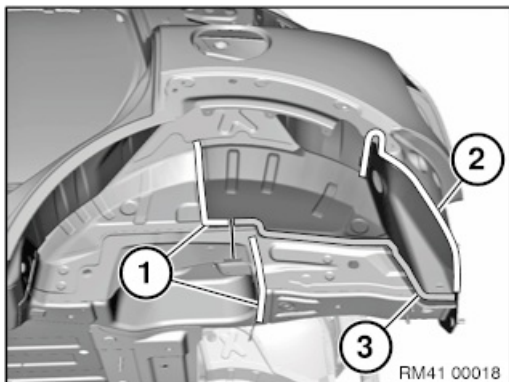


View from below.
Open spot-welded adhesive joints in area (1)
Remove the luggage compartment floor.

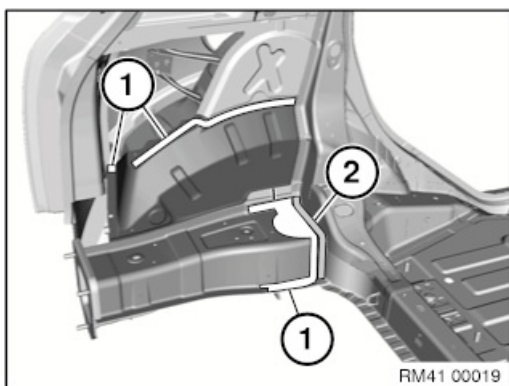




Mark severance cut (1) as pictured and cut. **Important!**
Cut outer panel only.



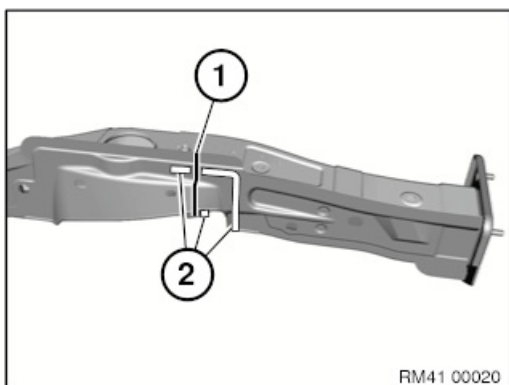
Open welded connections in areas (1).
Open spot-welded adhesive joints in area (2)
Installation note:
Weld new components in area (3) additionally.



Open welded connections in areas (1) and (2).
Remove side member and wheel arch.



New part preparation

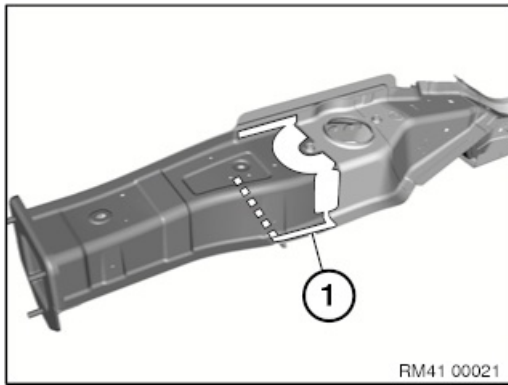


Mark severance cut (1) in accordance with vehicle and cut.

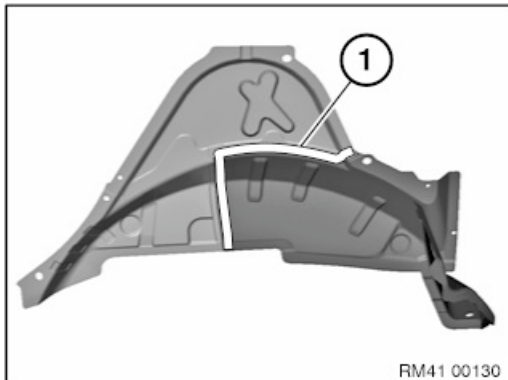
Important!
Cut outer panel only.

Open welded connections in areas (2).

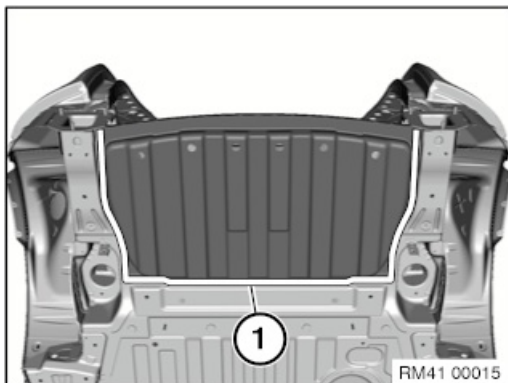




Open welded connections in areas (1).
Remove components not needed.



Open welded connections in area (1).
Remove components not needed.
Adjust new parts to fit with alignment bracket or universal mount and secure.



Fit luggage compartment floor from underneath and adjust in conjunction with tail panel and secure.
Set 16 4.2 mm dia. bore holes for blind rivets in area (1).
Remove new part and deburr holes.



Important!
Do not grind new parts and body in area of bonding surfaces.

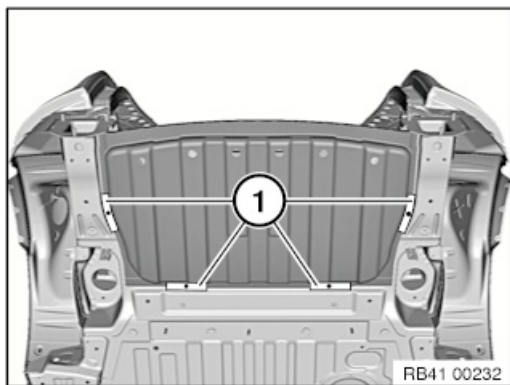


Installation of side members, inner wheel arch halves
Install new parts with alignment bracket or universal mount and weld.



Installation of luggage compartment floor:
Clean all bonding surfaces with cleaning agent R1.
Apply adhesive to bonding surfaces.
Install new part and rivet with blind rivets





After hardening of the adhesive, install 4 EMC screws in the areas (1).



41 11 751

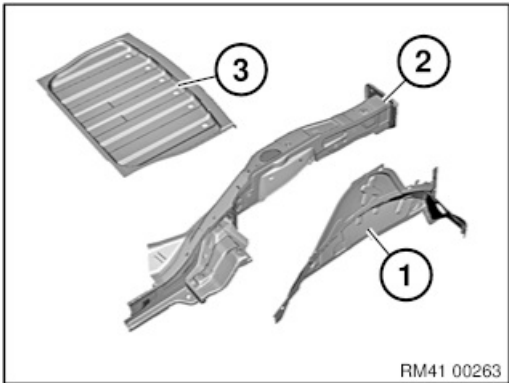
Replacing luggage compartment floor and side member on left
(left side wall and tail panel removed)



Read contents of Body, General.
Strip down vehicle
Spot-weld bonding is used on this vehicle. Observe specific procedure.
Place vehicle on straightening bench.



Follow procedure for repair stage 3.



Following new body parts are required (see Electronic Parts Catalogue):

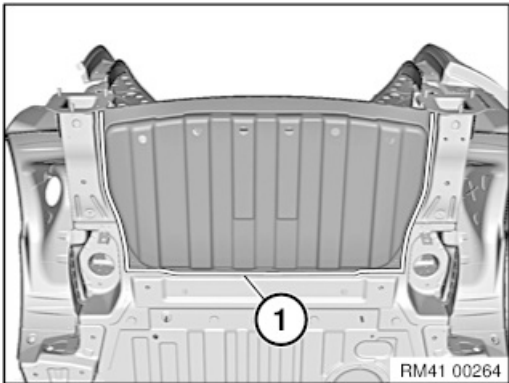
- (1) Wheel arch, rear, inner half, left
- (2) Frame side member, left rear
- (3) Luggage compartment floor, rear

Following consumables are required:

Material	Quantity
Adhesive K5a	2
Blind rivets N6	16
EMC screws	4
Cleaning agent R1	1
Sealant D1	

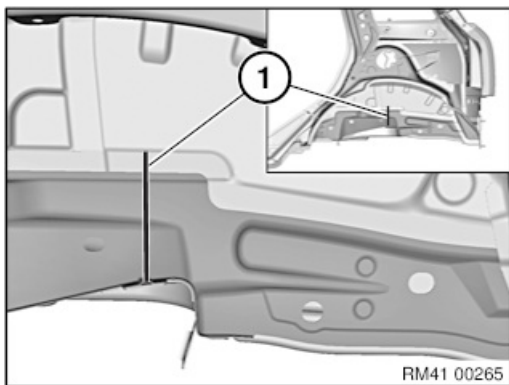


Removal

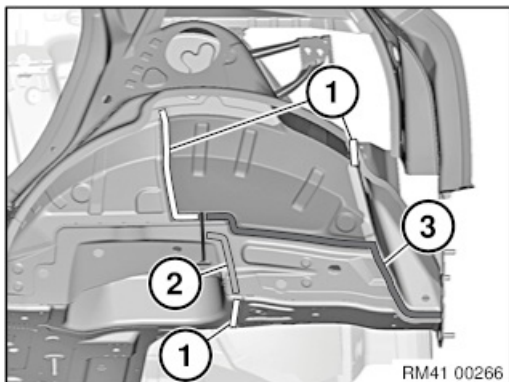


View from below.
Open spot-welded adhesive joints in area (1)
Remove the luggage compartment floor.

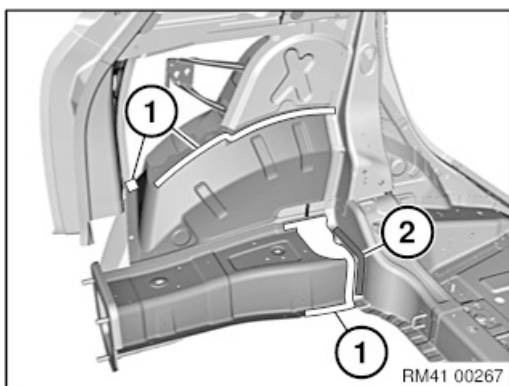




Mark severance cut (1) as pictured and cut. **Important!**
Cut outer panel only.



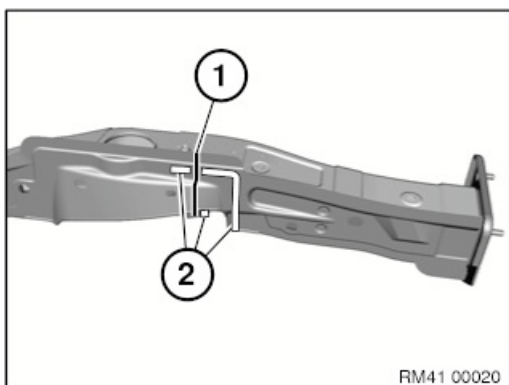
Open welded connections in areas (1).
Open spot-welded adhesive joints in area (2)
Installation note:
Weld new components in area (3) additionally.



Open welded connections in areas (1) and (2).
Remove side member and wheel arch.



New part preparation

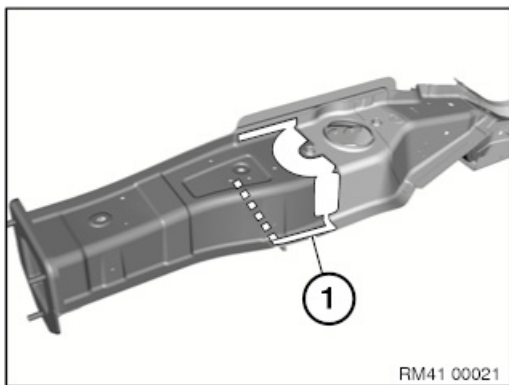


Mark severance cut (1) in accordance with severance cut on vehicle and cut.

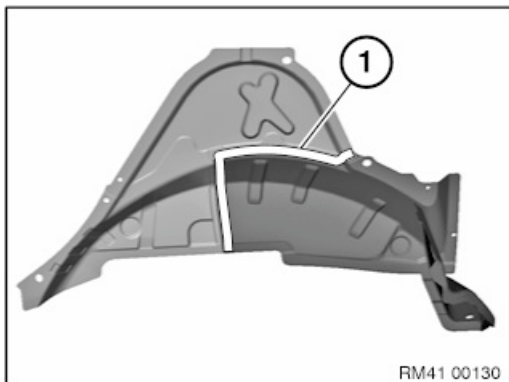
Important!
Cut outer panel only.

Open welded connections in areas (2).

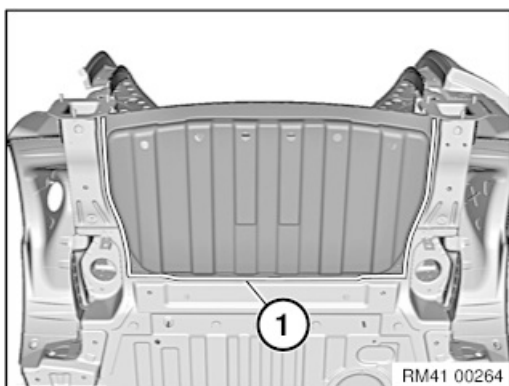




Open welded connections in areas (1).
Remove components not needed.



Open welded connections in area (1).
Remove components not needed.
Adjust new parts to fit with alignment bracket or universal mount and secure.



Fit luggage compartment floor from underneath and adjust in conjunction with tail panel and secure.
Set 16 4.2 mm dia. bore holes for blind rivets in area (1).
Remove new part and deburr holes.



Important!

Do not grind new part for the luggage compartment floor and body in area of bonding surfaces!



Installing side members and wheel arch

Install new parts with alignment bracket or universal mount and weld.

- Side member, rear left
- Wheel arch, rear, inner half



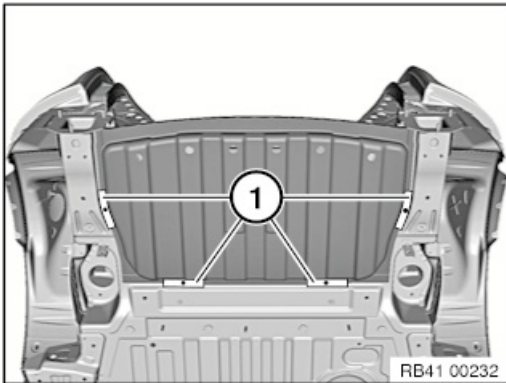


Installation of luggage compartment floor

Clean all bonding surfaces with cleaning agent R1.

Apply adhesive to bonding surfaces.

Install the luggage compartment floor and rivet with blind rivets.



After hardening of the adhesive, install 4 EMC screws in the areas (1).



41 12 557

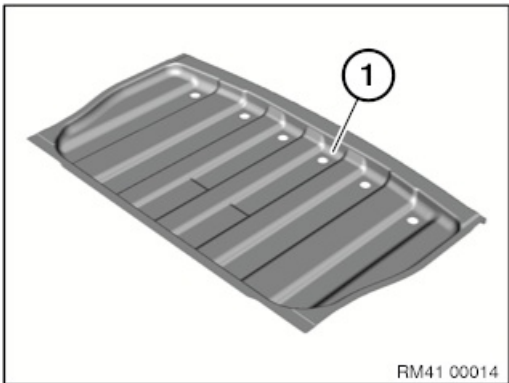
Replacing middle luggage compartment floor (tail panel has been removed)



Read contents of Body, General.
Strip down vehicle



Follow procedure for repair stage 2.



Following new body parts are required (see Electronic Parts Catalogue):

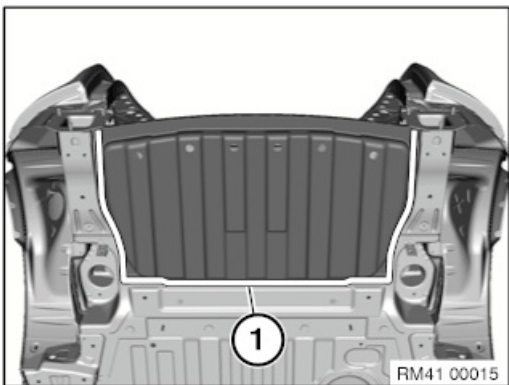
- (1) Luggage compartment floor

Following consumables are required:

Material	Quantity
Adhesive K5a	2
Blind rivets N6	16
EMC screws	4
Cleaning agent R1	1
Sealant D1	



Removal of luggage compartment floor

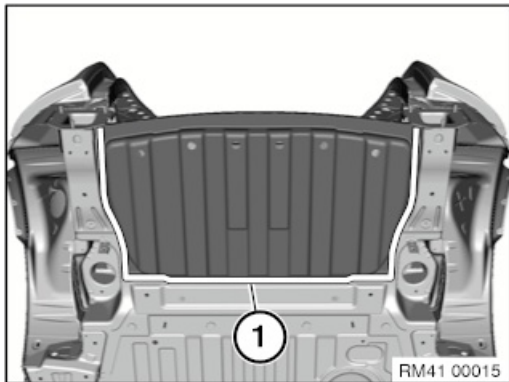


View from below.
Open spot-welded adhesive joints in area (1)
Remove the luggage compartment floor.



New part preparation





Fit luggage compartment floor from underneath and adjust in conjunction with tail panel and secure.

Set 16 4.2 mm dia. bore holes for blind rivets in area (1).

Remove new part and deburr holes.



Important!

Do not grind new parts and body in area of bonding surfaces.



Installation of luggage compartment floor

Clean all bonding surfaces with cleaning agent R1.

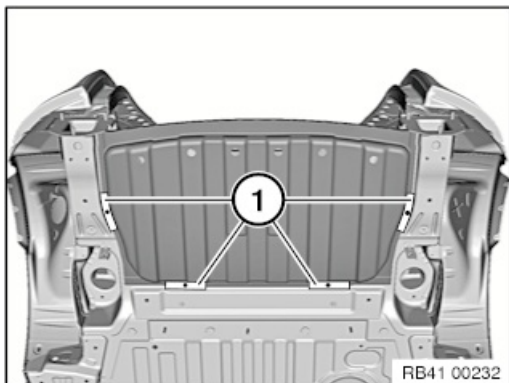
Apply adhesive to bonding surfaces.

Install new part and rivet with blind rivets.



Remove excess adhesive. **Important!**

Do not use any cleaning agents containing solvents.



After hardening of the adhesive, install 4 EMC screws in the areas (1).



41 11 751 Stripping operations - Replace the left side member and luggage compartment floor (removed left side wall and tail panel)

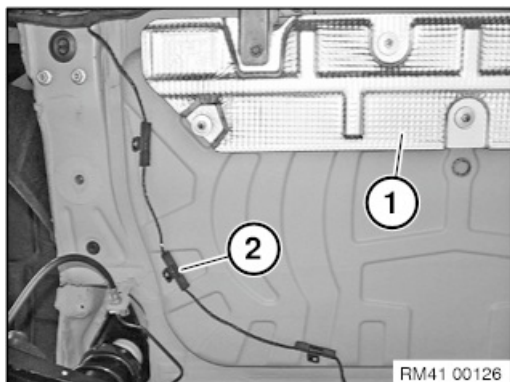


Note:

Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

- Remove rear left wheel arch cover (job number: 51 71 041)
- Detach the brake hose from the left brake pipe (job number: 03 34 006)
- Remove rear axle support (job number: 33 31 000)
- Remove the left rear spring strut shock absorber (job number: 33 52 100)



Remove heat shield (1).

Release wiring harness (2) from luggage compartment floor.



41 11 751 Stripping operations - replace the left side member and luggage compartment floor, all-wheel drive vehicle (removed left side wall and tail panel)



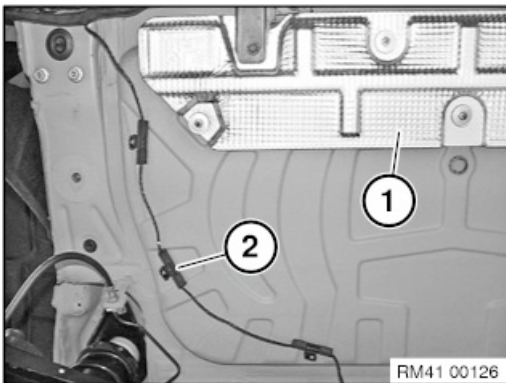
Note:

Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

Vehicles with four-wheel drive

- Remove rear left wheel arch cover (job number: 51 71 041)
- Detach the brake hose from the left brake pipe (job number: 03 34 006)
- Detach propeller shaft from rear axle final drive (job number: 26 11 000)
- Remove rear axle final drive (job number: 33 10 016)
- Remove the rear axle support (all wheel drive vehicle) (job number: 33 31 000)
- Remove the left rear spring strut shock absorber (job number: 33 52 100)



Remove heat shield (1).

Release wiring harness (2) from luggage compartment floor.



41 12 557 Stripping operations - Replacing centre luggage compartment floor, all-wheel drive vehicle (tail panel removed)



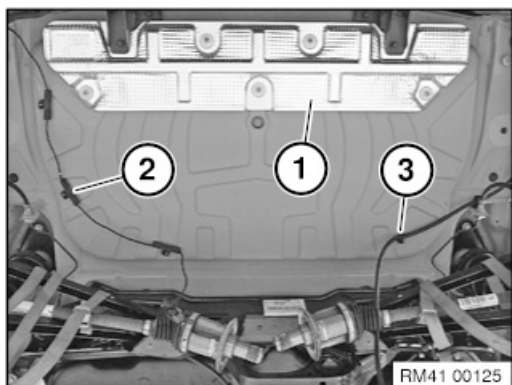
Note:

Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

Vehicles with four-wheel drive

- Remove rear axle final drive (job number: 33 10 016)



Remove heat shield (1).

Release wiring harness (2) from luggage compartment floor.

Release vent hose (3) from luggage compartment floor.



41 12 535 Stripping operations - Replacing luggage compartment floor and both side members (tail panel removed)

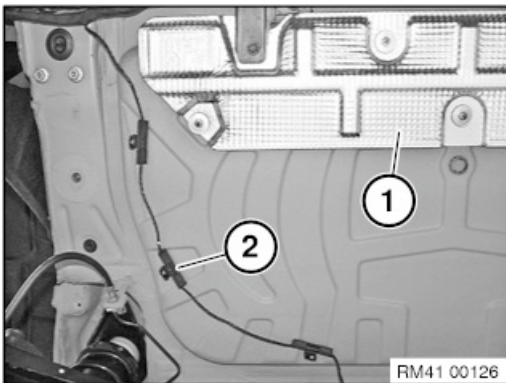


Note:

Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

- Remove rear wheel arch cover (job number: 51 71 041)
- Detach brake hose from brake pipe (job number: 03 34 006)
- Remove rear axle support (job number: 33 31 000)
- Remove spring strut shock absorber (job number: 33 52 100)



Remove heat shield (1).

Release wiring harness (2) from luggage compartment floor.



41 12 535 Stripping operations - Replacing luggage compartment floor and both side members, all-wheel drive (tail panel removed)



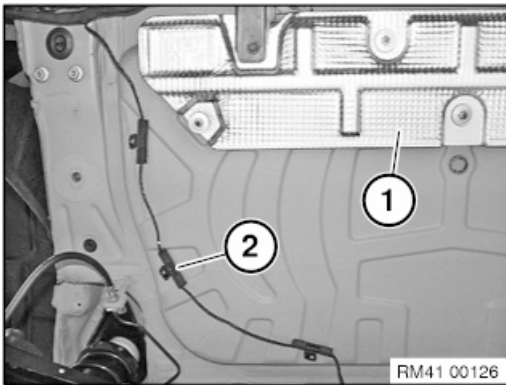
Note:

Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

Vehicles with four-wheel drive

- Remove rear wheel arch cover (job number: 51 71 041)
- Detach brake hose from brake pipe (job number: 03 34 006)
- Detach propeller shaft from rear axle final drive (job number: 26 11 000)
- Remove rear axle final drive (job number: 33 10 016)
- Remove rear axle support (all-wheel drive) (job number: 33 31 000)
- Remove spring strut shock absorber (job number: 33 52 100)



Remove heat shield (1).

Release wiring harness (2) from luggage compartment floor.



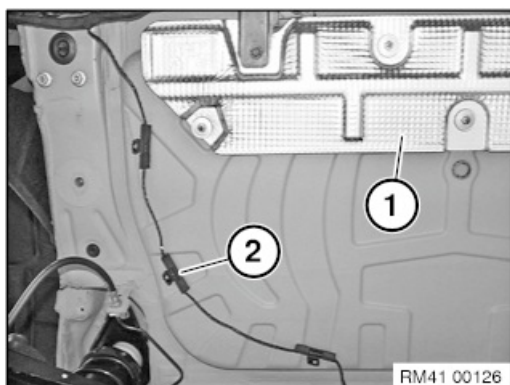
41 12 557 Stripping operations - Replacing luggage compartment floor, middle (tail panel removed)



Note:

Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.



Remove heat shield (1).

Release wiring harness (2) from luggage compartment floor.



41 ... 0 Notes on the repair technique used in the main group 41

Two different repair techniques are used in body repair.

These are welding and bonding/riveting.

If the repair instructions do not specify a repair technique, then welding must **always** be used.

The bonding/riveting repair technique is **always** described in detail in the repair instructions.

Quality standards must be met.



Replacing engine support with left wheel arch in front of



Read contents of Body, General.

Observe procedure of repair stage 3.

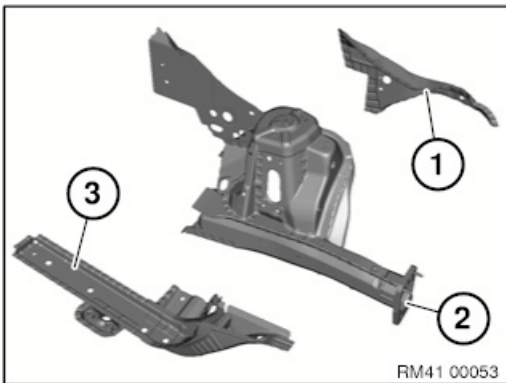
For stripping and rigging operations, refer to texts on KSD CD (job number 41 11 071).

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Spot-weld bonding is used on this vehicle. Observe specific procedure.

Use only approved spot-welding apparatus for repairs.

Place vehicle on straightening bench.

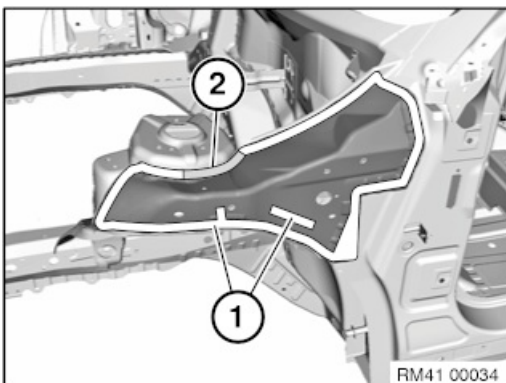


The following new body parts are required (refer to Electronic Parts Catalogue):

- (1) Carrier support, wheel arch, outer
- (2) Wheel arch, front
- (3) Engine support, rear



Removal of engine support with wheel arch

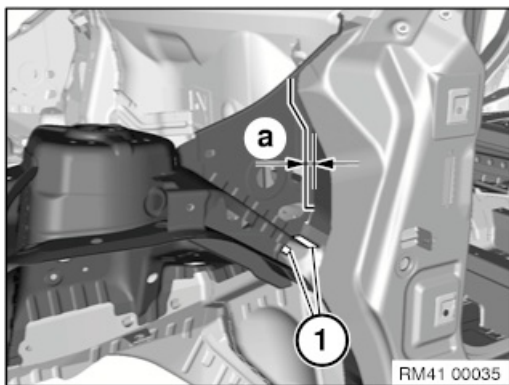


Open welded connections in areas (1).

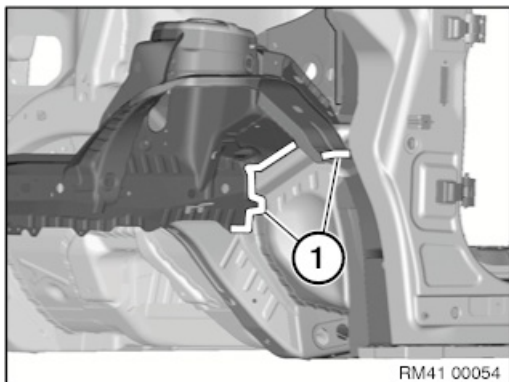
Open spot-welded adhesive joints in area (2).

Remove the carrier support for wheel arch.

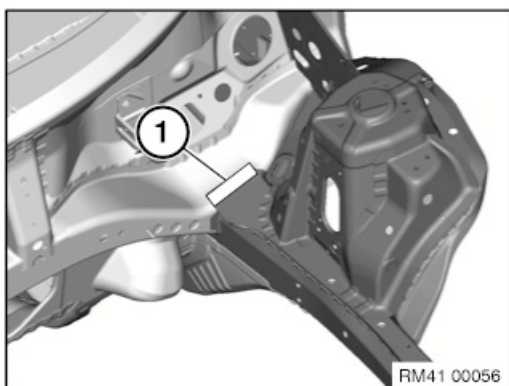




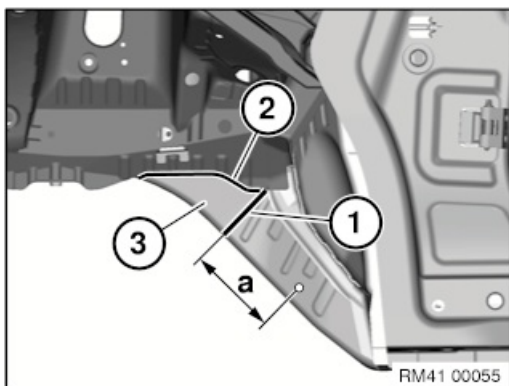
Mark severance cut in accordance with dimension and cut.
 Dimension a = 20 mm from A-pillar component.
 Open welded connections in areas (1).
Installation note:
 Weld on new part, overlapping severance cut connection face.



Open welded connections in areas (1).

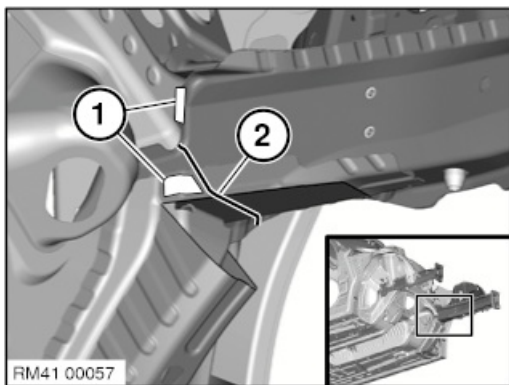


Open welded connections in area (1).



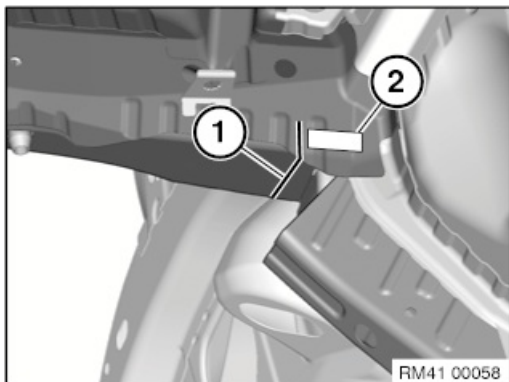
Mark severance cut (1) in accordance with dimension and cut.
 Dimension a = approx. 135 mm from centre of 10 mm dia. hole.
 Mark severance cut (2) as pictured and cut.
 Remove section (3).





Open welded connections in areas (1).

Mark severance cut (2) on engine support as pictured and cut.



Outer side of engine support.

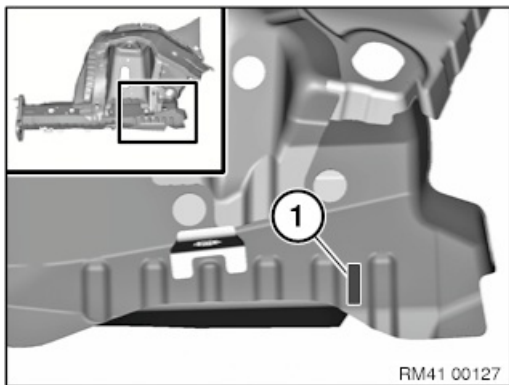
Mark severance cut (1) as pictured and cut.

Open welded connections in area (2).

Remove engine support with wheel arch.

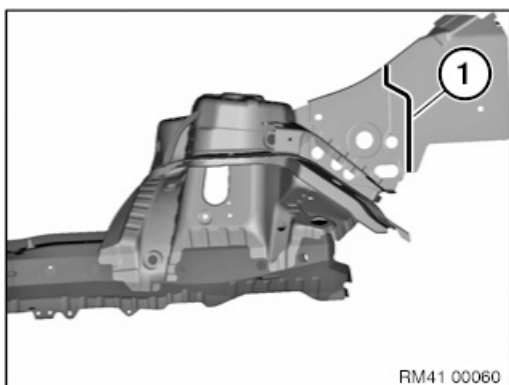


New part preparation



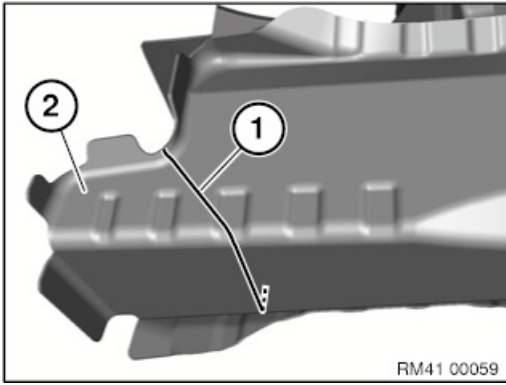
Grind a V-shaped groove (1) into engine support. *Note:*

In area (1), all 3 panels and the reinforcement plate must be properly MAG welded to each other.

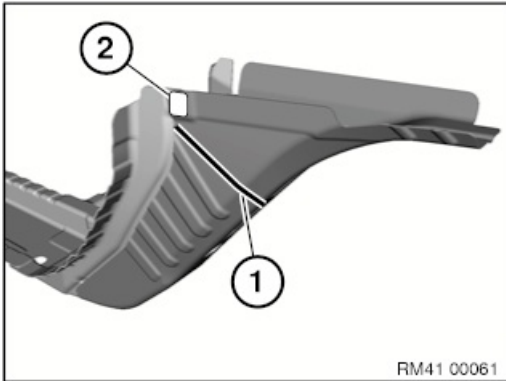


Mark severance cut on new wheel arch part in accordance with severance cut on vehicle +20 mm extra material and cut (1). *Note:* New part is installed with overlap in area of severance cut (1).

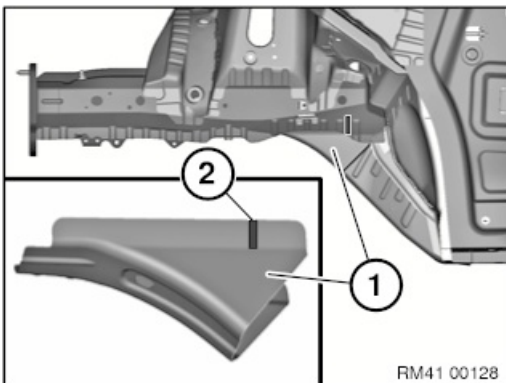




Mark severance cut (1) in accordance with vehicle and cut.
Remove metal section (2).



Mark severance cut (1) on new engine support part in accordance with severance cut on vehicle and cut (1).
Release welded connection (2) and take off engine support section.

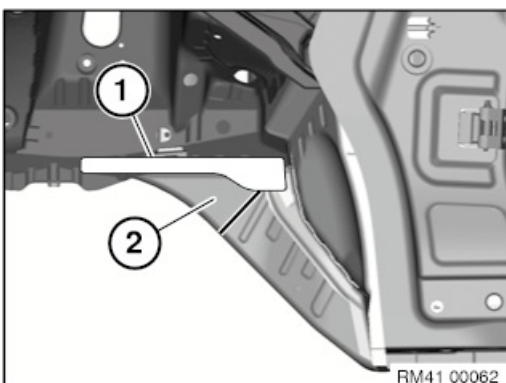


Grind a V-shaped groove (2) into the engine support section (1).
Determine the correct position of the groove by fitting the section into the new wheel arch part.
Prepare reinforcement plates at severance cuts.
Adjust new parts to fit with alignment bracket or universal mounting.



Installation of engine support with wheel arch

Install new parts and reinforcement plates with alignment bracket or universal mount and weld.



Note:

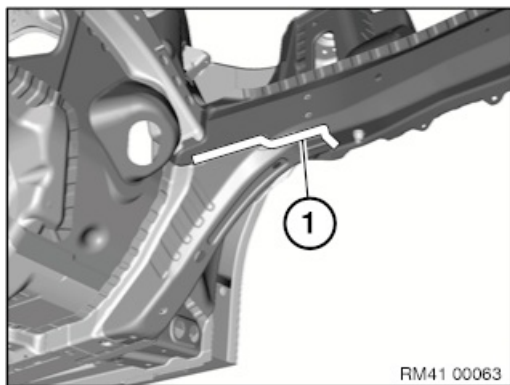
Only weld new parts in area (1) after installation of engine support section (2).

Additionally weld new parts in area (1) using plug welding method.

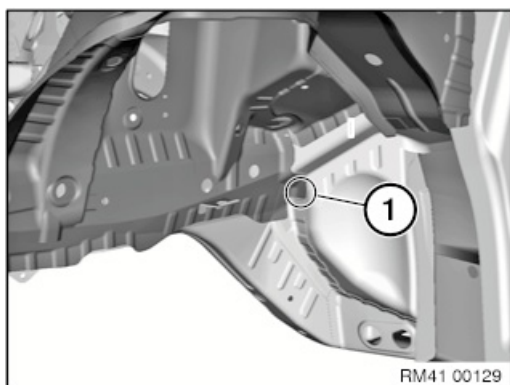
Note:

In area (1), all 3 panels and the reinforcement plate must be properly MAG welded to each other.





Additionally weld new parts in area (1) using plug welding method.



In area (1) drill 1 Ø 6.8 mm hole for blind rivet.

Important!

Risk of damage!

Do not drill through add-on parts in passenger compartment behind panel.

Rivet new engine support part in area (1) with blind rivet N1.





Read contents of Body, General.

Observe procedure of repair stage 3.

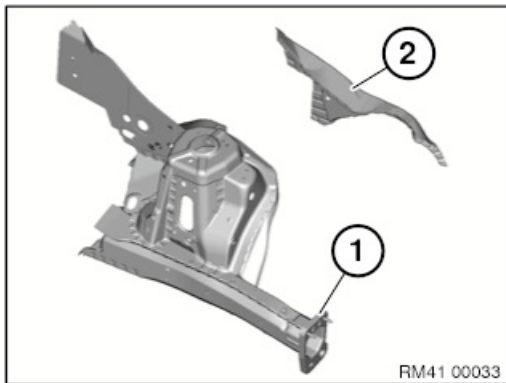
For stripping and rigging operations, refer to texts on KSD CD (job number 41 14 020).

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Spot-weld bonding is used on this vehicle. Observe specific procedure.

Use only approved spot-welding apparatus for repairs.

Place vehicle on straightening bench.

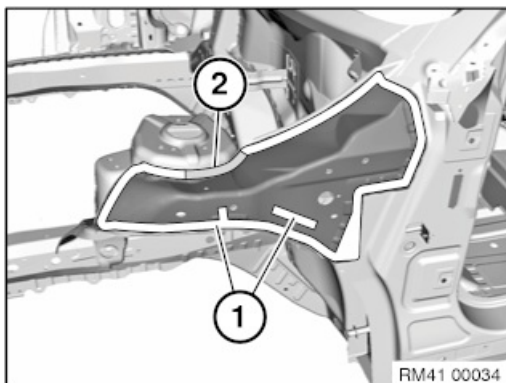


The following new body parts are required (refer to Electronic Parts Catalogue):

- (1) Wheel arch, front
- (2) Outer wheel arch carrier support



Removing the wheel arch

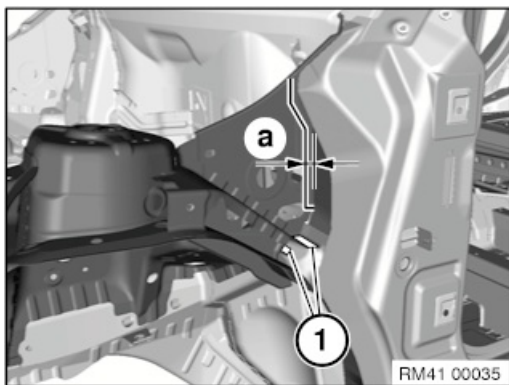


Open welded connections in areas (1).

Open spot-welded adhesive joints in area (2).

Remove the carrier support.





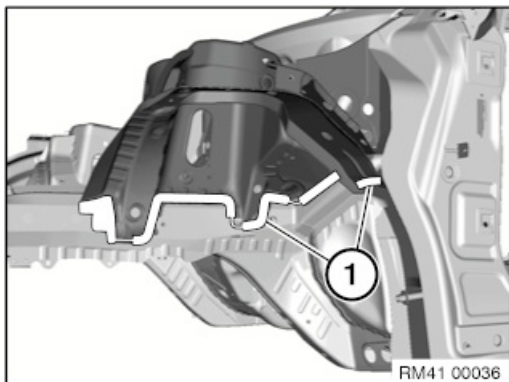
Mark severance cut in accordance with dimension and cut.

Dimension a = 20 mm from A-pillar component.

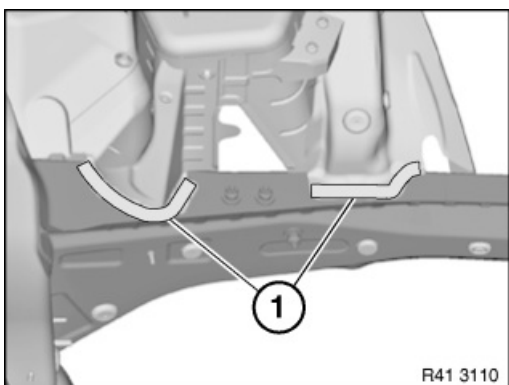
Open welded connections in areas (1).

Installation note:

Weld on new part, overlapping severance cut connection face.



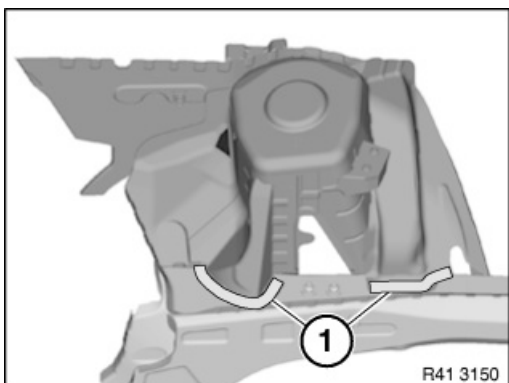
Open welded connections in areas (1).



Open welded connections in areas (1).

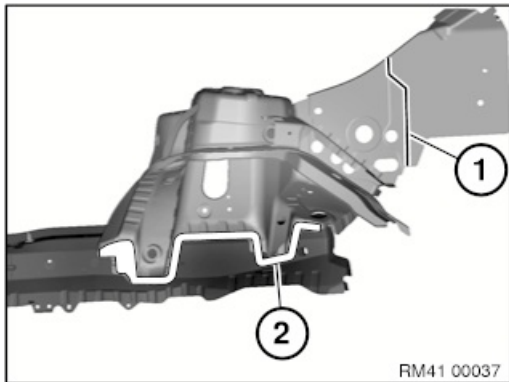


New part preparation



Open welded connections in areas (1).





Mark severance cut on new part in accordance with severance cut on vehicle +20 mm extra material and cut (1).

Open welded connections in areas (2).



Installing the wheel arch

Adjust new parts with alignment bracket or universal mount and weld.



**Special tools required:**

- 83 30 2 239 964
- 41 0 000
- 2 239 964

**Note:**

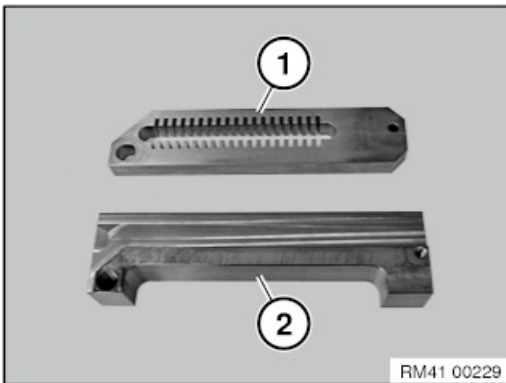
If the stamped vehicle identification number is removed during repair work, it must be stamped in again.

For replacement of wheel arch: Stamp in vehicle identification number prior to installation of wheel arch.

Read and comply with General Notes.

**Necessary preliminary tasks:**

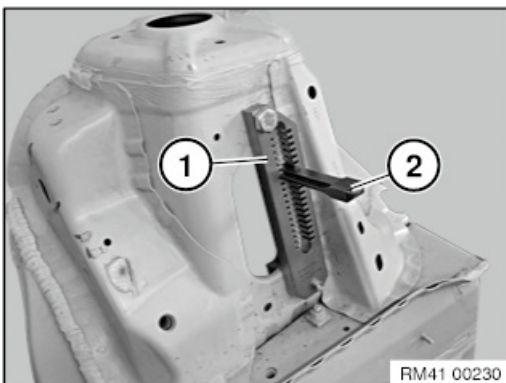
- Remove front right spring strut.
- Remove front right wheel arch cover.
- Remove front right brake line
- If necessary, remove engine



Punching gauge 2 239 964 for stamping the vehicle identification number consists of:

- (1) = Guide plate
- (2) = Counter-support plate
- (3) = Mounting bolts (not shown)

The following special tool is additionally required: Punch numbers 41 0 000 (not shown)

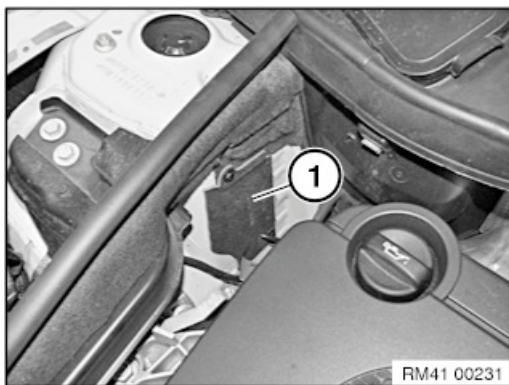


Position counter-support plate on spring strut from bottom.

Position guide plate (1) on spring strut support plate from top and screw to counter-support plate.

Insert punch numbers (2) individually into guide plate and stamp vehicle identification number.





If fitted: Adapt sound insulation (1) to vehicle identification number.



Note:

In the event of component or body replacement by the workshops/garages, clearly delimit the vehicle identification number at front and rear by stamping a "+" in place of the BMW emblem.

Note national regulations.



41 ... 0 Notes on the repair technique used in the main group 41

Two different repair techniques are used in body repair.

These are welding and bonding/riveting.

If the repair instructions do not specify a repair technique, then welding must **always** be used.

The bonding/riveting repair technique is **always** described in detail in the repair instructions.

Quality standards must be met.





Read contents of Body, General.

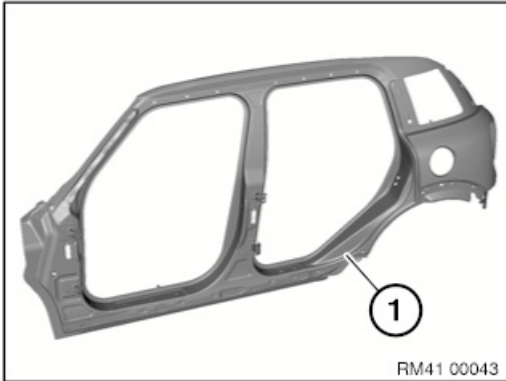
Procedure Observe repair stage 3!

For stripping and rigging operations, refer to texts on KSD CD (job number 41 21 201).

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Use only approved spot-welding apparatus for repairs.

Place vehicle on straightening bench.

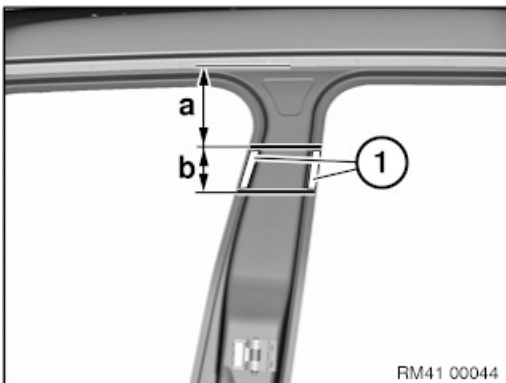


The following new body parts are required (refer to Electronic Parts Catalogue):

- (1) Side frame, outer
- (2) opening separation B-pillar bottom inside.



Removal of B-pillar with reinforcement



Mark severance cuts in accordance with specified dimensions and cut.

Important!

Cut outer panel only for following severance cuts.

Dimension a = approx. 150 mm from component edge of roof outer skin.

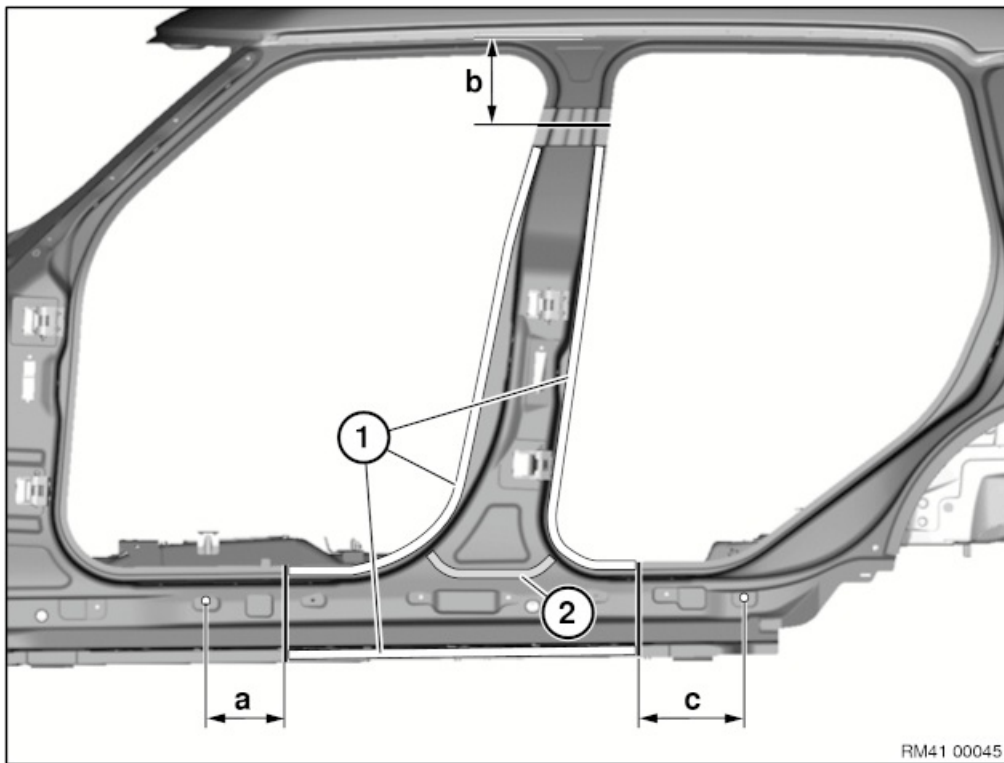
Dimension b = approx. 100 mm below cut a.

Open welded connections in area (1).

Note:

Cut out metal section is needed again for sealing.





Mark severance cuts in accordance with specified dimensions and cut.

Important!

Cut outer panel only for following severance cuts.

Dimension a = approx. 160 mm from centre point of 8 mm dia. hole.

Dimension b = approx. 200 mm from component edge of roof outer skin.

Dimension c = approx. 200 mm before centre point of hole dia. 8 mm.

Open welded connections in areas (1).

Release B-pillar from cavity sealing (2) and remove



New part preparation

Mark severance cuts on new part in accordance with severance cuts on vehicle and cut.

Prepare reinforcement plates at severance cuts.

Adjust new parts to fit with alignment bracket or universal mounting.



Installation of B-pillar with reinforcement

Apply sealant to cavity sealing.

Install new parts and reinforcement plates with alignment bracket or universal mount and weld.





Read contents of Body, General.

Procedure Observe repair stage 3!

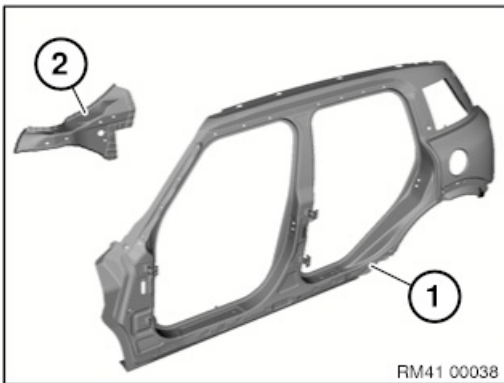
For stripping and rigging operations, refer to texts on KSD CD (job number 41 21 003).

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Spot-weld bonding is used on this vehicle. Observe specific procedure.

Use only approved spot-welding apparatus for repairs!

Place vehicle on straightening bench.

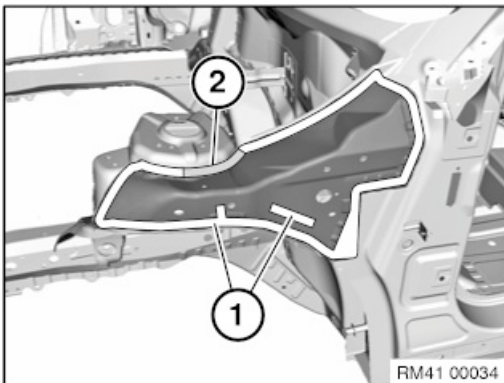


The following body new parts are required (refer to Electronic Parts Catalogue)

- (1) Side frame, outer
- (2) Outer wheel arch carrier support
- Adhesive K1



Removing the A-pillar with reinforcement

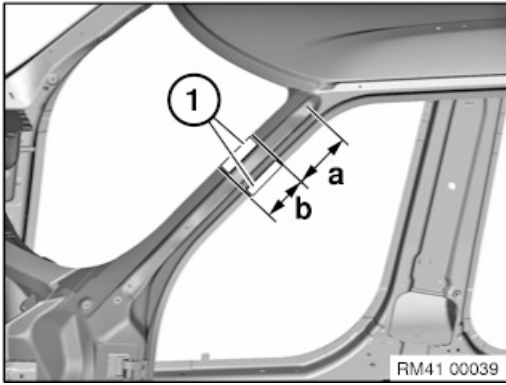


Open welded connections in areas (1).

Open spot-welded adhesive joints in area (2).

Remove the carrier support.





Mark severance cuts in accordance with specified dimensions and cut.

Important!

Cut outer panel only for following severance cuts.

Dimension a = 95 mm from centre point of 8 mm dia. hole.

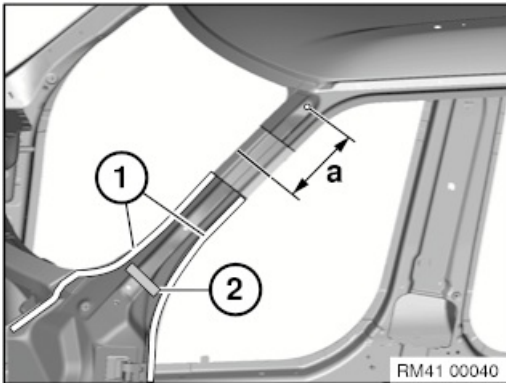
Dimension b = 120 mm below severance cut a.

Open welded connections in areas (1).

Remove sheet section.

Note:

Cut out metal section is needed again for sealing.



Important!

For following severance cut, do not damage slide/tilt sunroof water drain hose.

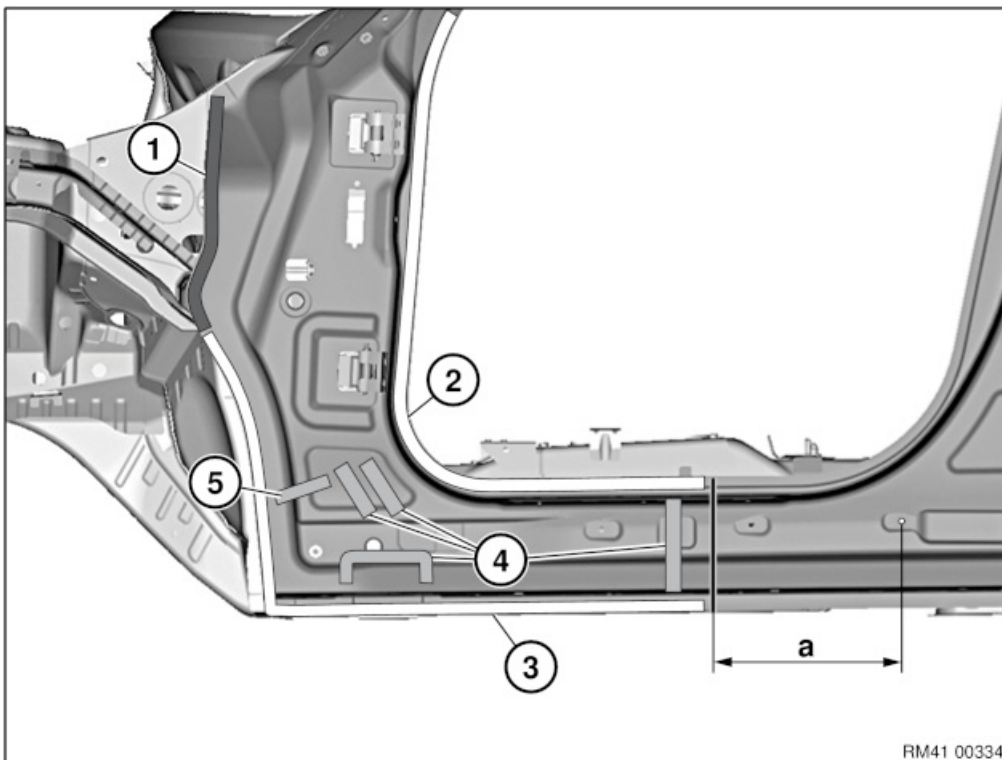
Cut outer panel only.

Mark severance cut in accordance with specified dimension and cut.

Dimension a = 155 mm from centre point of 8 mm dia. hole.

Open welded connections in areas (1).

(2) = Cavity sealing



Mark severance cut in accordance with specified dimension and cut.

Important!

Cut outer panel only.

Dimension a = approx. 260 mm before centre of 8 mm dia. hole.

Open spot-welded adhesive joints in area (1)

Open welded connections in areas (2) and (3).

Open bonded connections in areas (4).

Release A-pillar from cavity sealing (5) and remove.

Note:



To release the bonded connections in areas (4) it may be necessary to remove the outer skin in this area.

See installation of A-pillar for further schematic diagram of bonded connections.

Area (3) must be sealed according to standard after welding of new part.



New part preparation

Mark severance cuts on new part in accordance with severance cuts on vehicle and cut.

Prepare reinforcement plates at severance cuts.

Adjust new parts to fit with alignment bracket or universal mounting.



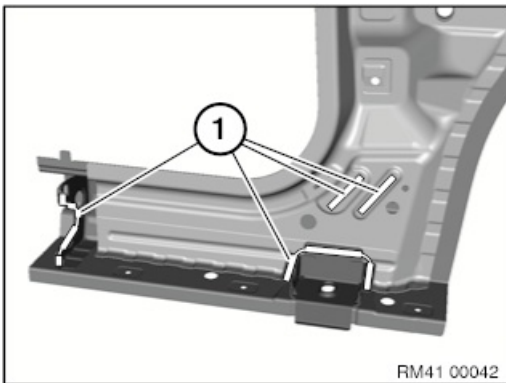
Important!

Structure bonding!

Observe preparation of bonding surfaces.



Installing the A-pillar with reinforcement



Apply adhesive to areas (1) K1.

Apply sealant to cavity sealing.



Install new parts and reinforcement plates with alignment bracket or universal mount and weld analogue to series standard.



41 ... 0 Notes on the repair technique used in the main group 41

Two different repair techniques are used in body repair.

These are welding and bonding/riveting.

If the repair instructions do not specify a repair technique, then welding must **always** be used.

The bonding/riveting repair technique is **always** described in detail in the repair instructions.

Quality standards must be met.



41 ... 0 Notes on the repair technique used in the main group 41

Two different repair techniques are used in body repair.

These are welding and bonding/riveting.

If the repair instructions do not specify a repair technique, then welding must **always** be used.

The bonding/riveting repair technique is **always** described in detail in the repair instructions.

Quality standards must be met.



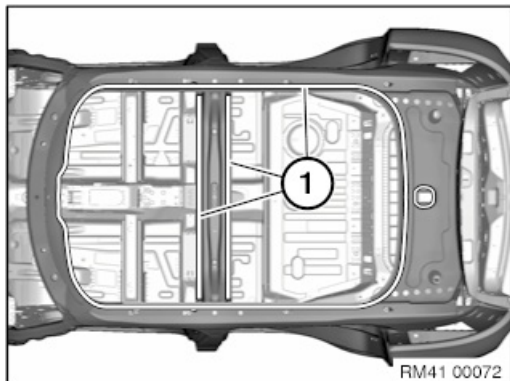
41 31 000

Replace roof outer skin



Refer to repair instructions Roof outer skin with slide/tilt sunroof for procedure and carry over schematically to the vehicle.

Strip down vehicle.



Installing roof outer skin

Apply D2 sealant in areas (1) in the same way as in series standard.





Read contents of Body, General.
Strip down vehicle.



Procedure Observe repair stage 2!



The following new body parts are required (refer to Electronic Parts Catalogue).

- (1) Roof outer skin, panorama glass roof

Following consumables are required:

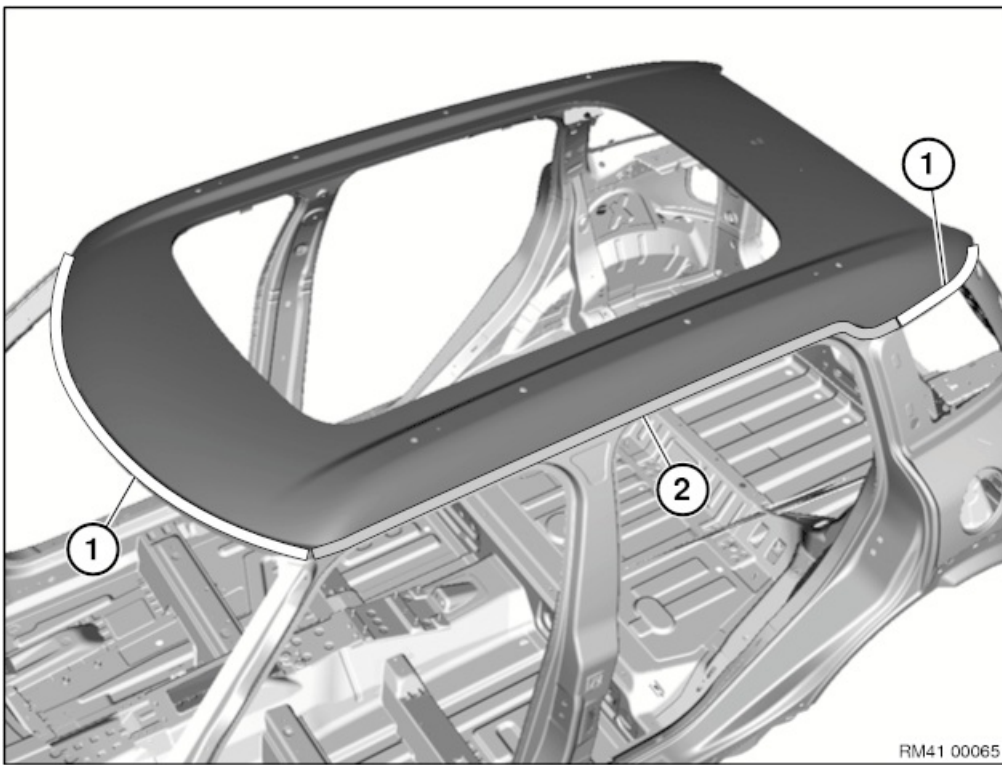
Material	Quantity
Adhesive K5a	1
Adhesive K5b	1
Blind rivets N3	14
Punch rivets N4	23
EMC screws	2
Cleaning agent R1	1
Sealant D2	1



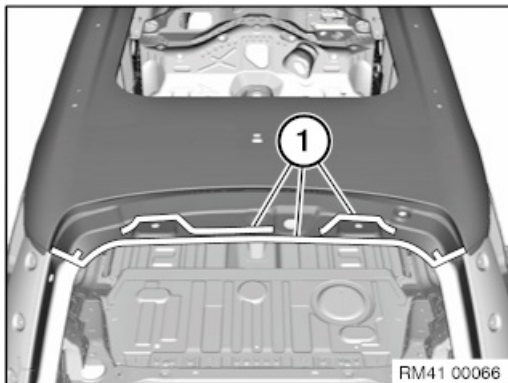
Removing roof outer skin

Operation is partially described on the left side. Right side identical.



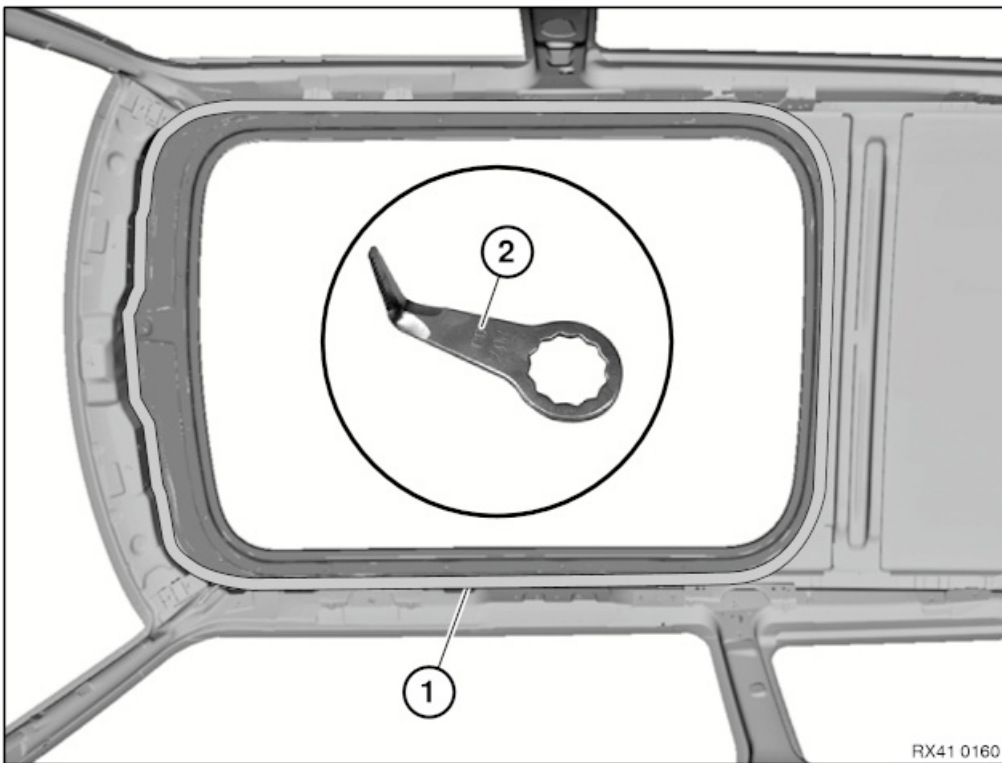


- Open welded connections in areas (1).
- Open spot-welded adhesive joints in area (2)
- Release 1 rivet connection in area (2).



- Open welded connections in areas (1).

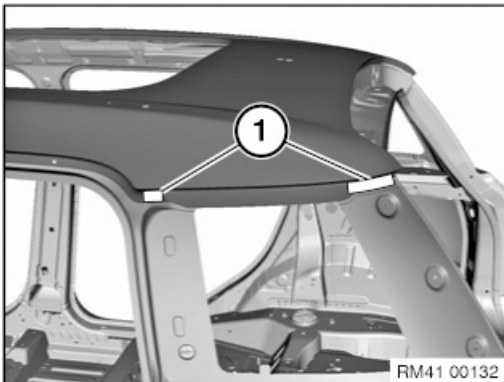




Loosen bonded connections in the areas (1) with an oscillating knife (2) (compare with removal of windscreen).
Take off roof outer skin.

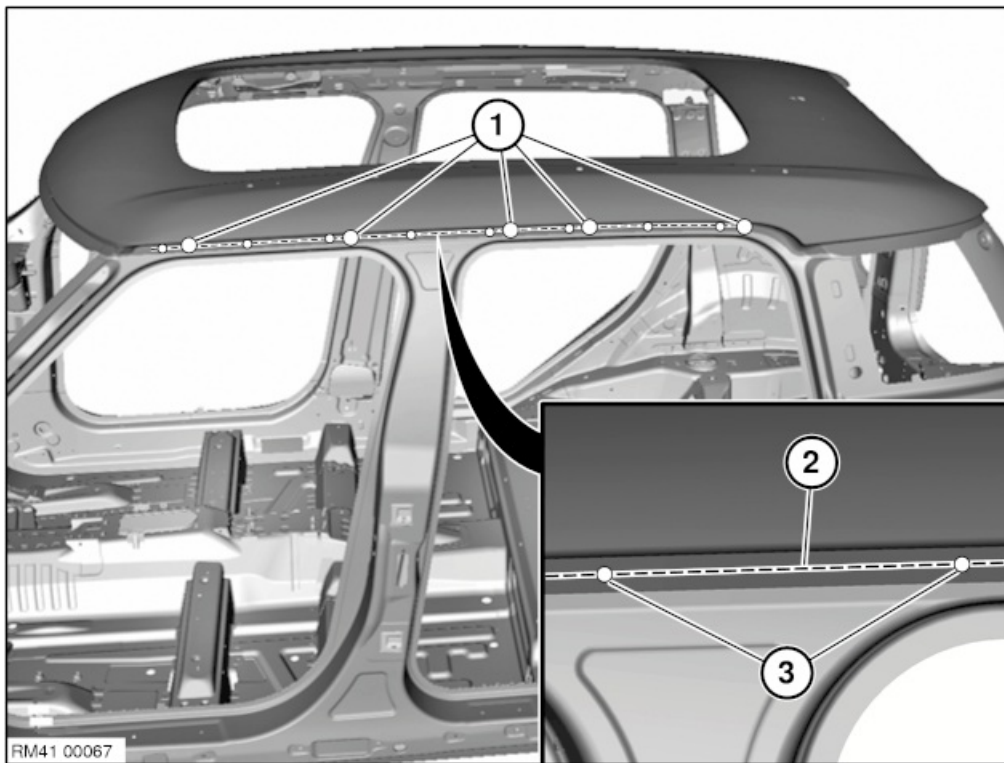


New part preparation



Adjust roof outer skin to fit and secure.
Set one 4.2 mm bore hole for blind rivets in each of areas (1).





In area (1) set 5 bore holes dia. 4.2 mm for blind rivets . Note:
 Bore holes must be set on centre line (2) of holes (3) present on new part.
 The procedure is the same for the right side of the vehicle.
 Remove new part again and deburr bore holes.



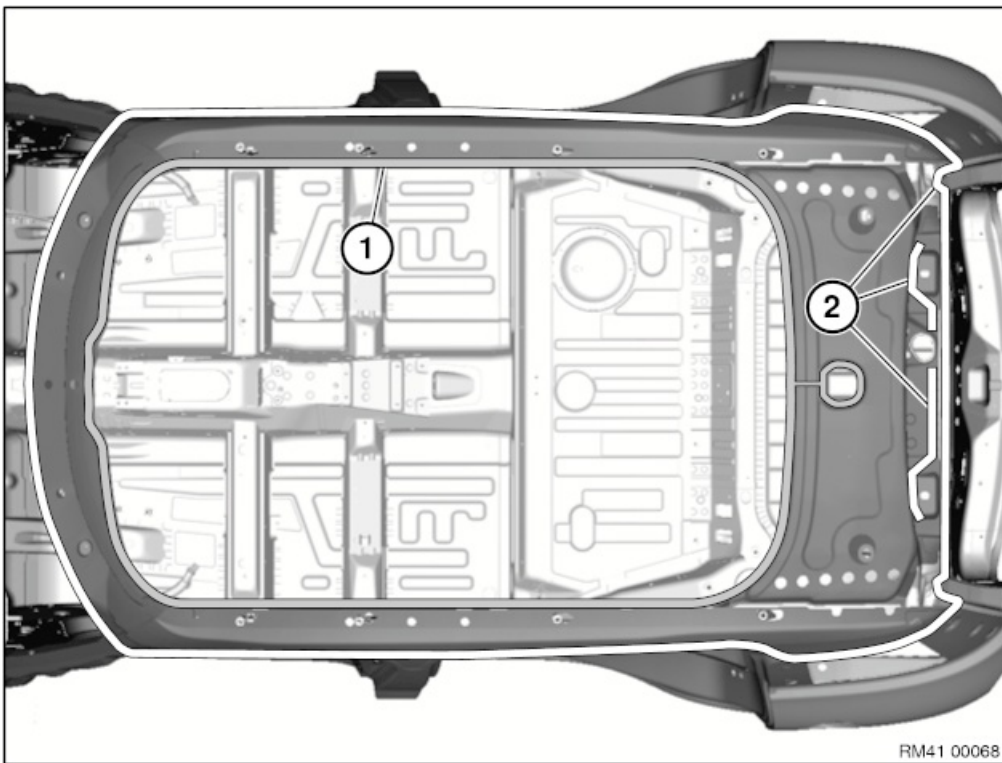
Attention!

Do not grind/sand new part in area of bonding surfaces.



Installing roof outer skin



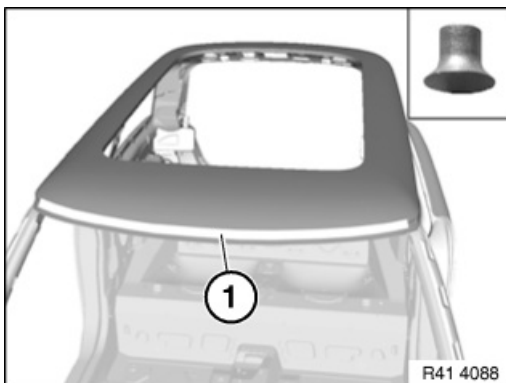


Clean all bonding surfaces with cleaning agent R1.

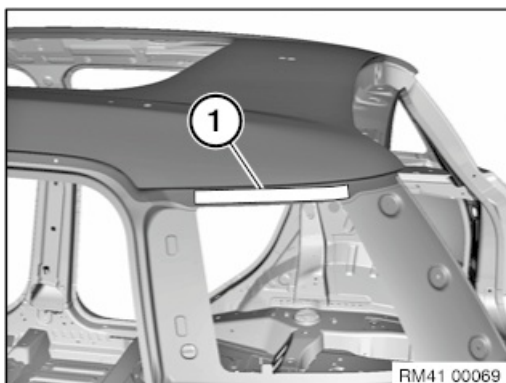
In area (1), apply sealant D2 in same way as standard procedure.

Apply adhesive in areas (2).

Install roof outer skin and rivet with blind rivets.

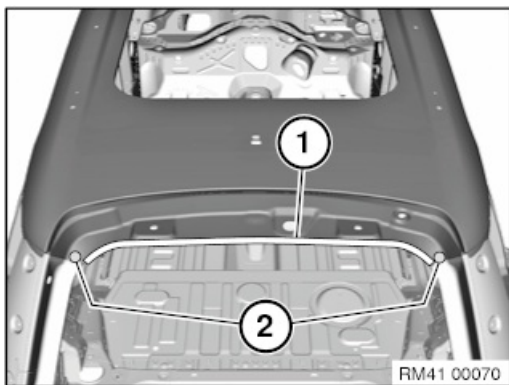


In area (1) rivet roof outer skin with 7 punch rivets.



In area (1), rivet roof outer skin with 3 punch rivets.





In area (1) rivet roof outer skin with 8 N4 punch rivets.

Use one punch rivet each in these areas (2).

Attention!

Note the indentation on the bottom in the areas (2)!



Install the tailgate hinges until the adhesive hardens.

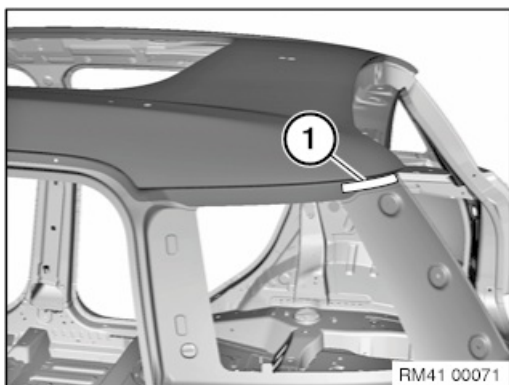
Avoid contact between adhesive and hinges.

Remove excess adhesive.

Attention!

Do not use any cleaning agents containing solvents.

Seal adhesive areas and blind rivets with sealant D2.



Fit an EMC screw after adhesive has hardened in area (1).





Note:

Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

- Remove and install headlining (job number: 51 44 001)
- Remove roof rails on left and right (job number: 51 13 305)
- Remove panorama glass roof (job number: 54 13 085)
- Remove airbag holder on left and right (job number: 54 10 016)
- Remove and install windscreen (job number: 51 31 000)
- Remove both rear seats (job number: 52 26 005)
- Luggage compartment wheel arch panel (job number: 51 47 151)
- Remove left side window (job number: 51 36 070)
- Remove right side window (job number: 51 36 070)
- Remove roof aerial (job number: 65 20 022)
- Remove tailgate (job number: 41 62 000)
- Remove tailgate hinges (job number: 41 62 070)
- Partially detach tailgate seal



*Note:*

Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

- Remove and install headlining (job number: 51 44 001)
- Remove roof rails on left and right (job number: 51 13 305)
- Remove and install windscreen (job number: 51 31 000)
- Remove both rear seats (job number: 52 26 005)
- Luggage compartment wheel arch panel (job number: 51 47 151)
- Remove left side window (job number: 51 36 070)
- Remove right side window (job number: 51 36 070)
- Remove roof aerial (job number: 65 20 020)
- Remove tailgate (job number: 41 62 000)
- Remove tailgate hinges (job number: 41 62 070)
- Partially detach tailgate seal



41 ... 0 Notes on the repair technique used in the main group 41

Two different repair techniques are used in body repair.

These are welding and bonding/riveting.

If the repair instructions do not specify a repair technique, then welding must **always** be used.

The bonding/riveting repair technique is **always** described in detail in the repair instructions.

Quality standards must be met.



41 32 031 windscreen

Replace the A-pillar on the outside left in the area of the



Follow procedure for repair stage 3.

Read contents of Body, General.

For stripping and rigging operations, refer to texts on KSD CD (FRU number 41 32 031).

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Use only approved spot-welding apparatus for repairs.



Important!

Operations on pyrotechnical devices may only be carried out by authorised experts.

Improper, unauthorised operations may result in serious dangers.

Unauthorized persons are strictly prohibited from performing any operations on this system.



Warning!

Read and comply with safety instructions for handling airbag modules and pyrotechnical belt tensioners.

Incorrect handling can activate airbag and cause injury.

A damaged head airbag must be replaced.

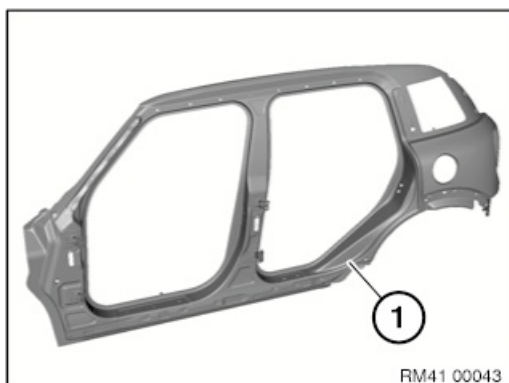
A damaged head airbag exhibits an impaired protective function and in extreme cases loses its protective function altogether.



Necessary preliminary tasks:

Disconnect negative battery cable.

Remove trim panel for roof pillar.



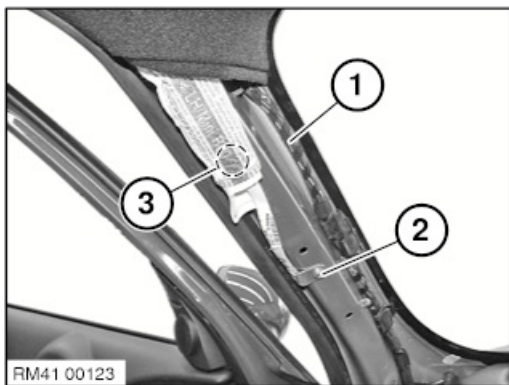
The following body new parts are required (refer to Electronic Parts Catalogue)

- (1) Side frame, outer



Removing the A-pillar in the area of the windscreen





Release wiring harness (1) from A-pillar.

Release screw (2) for airbag.

Tightening torque 72 12 8AZ.

Release airbag at attachment point (3).

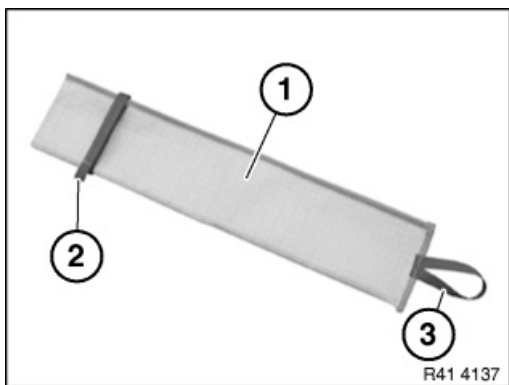
Important!

For the exact procedure, see repair instructions for removing and installing head airbag!

Important!

Risk of damage!

Airbag must not be kinked or bent!



Note:

Use protective sleeve (1) to protect the airbag.

Check protective sleeve for damage prior to use.

A damaged protective sleeve must not be used!

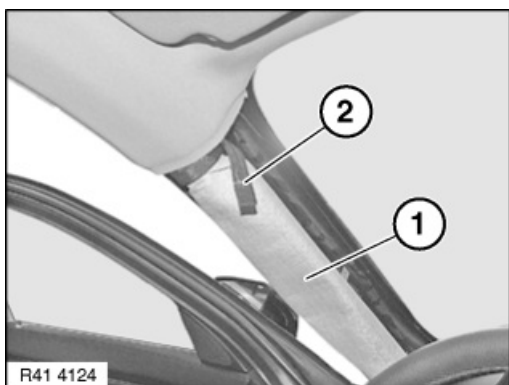
(2) Velcro fastener

(3) Loop

- Order number, protective sleeve: 81 47 2 159 578

Sourcing reference:

BMW Workshop Equipment Catalogue

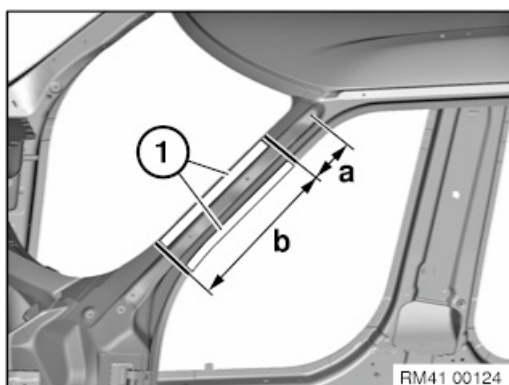


Slide protective sleeve (1) onto airbag under roof liner so that airbag is completely covered.

Fasten protective sleeve with Velcro fastener (2).

Secure protective sleeve with airbag against kinking.

Graphic representation similar.



Mark severance cuts in accordance with specified dimensions and cut.

Important!

Cut outer panel only for following severance cuts.

Dimension a = approx. 95 mm from centre point of 8 mm diameter hole.

Measurement b = approx. 345 mm below severance cut a.

Open welded connections in areas (1).





New part preparation

Mark severance cuts on new part in accordance with severance cuts on vehicle and cut.

Prepare reinforcement plates at severance cuts.

Fit in new part.



Installing the A-pillar in the area of the windscreen

Install and weld new parts and reinforcement plates.

After completing welding work:

Check airbag in area of protective sleeve for damage, replace if necessary.



41 ... 0 Notes on the repair technique used in the main group 41

Two different repair techniques are used in body repair.

These are welding and bonding/riveting.

If the repair instructions do not specify a repair technique, then welding must **always** be used.

The bonding/riveting repair technique is **always** described in detail in the repair instructions.

Quality standards must be met.

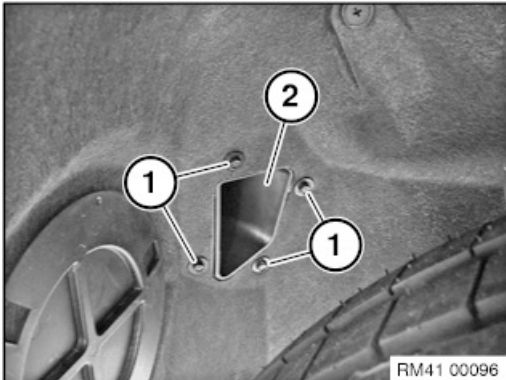


**Special tools required:**

- 2 346 947

**Necessary preliminary work:**

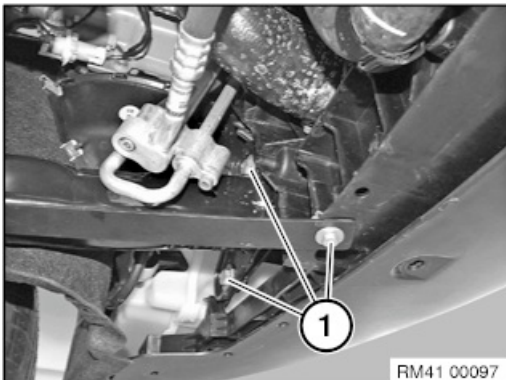
- Remove centre of front grille
- Remove both headlights
- Remove underbody protection
- Detach front wheel arch trim from bumper panel
- Partially detach front wheel arch cover



View of left wheel arch.

Release screws (1) and remove air duct for brake (2).

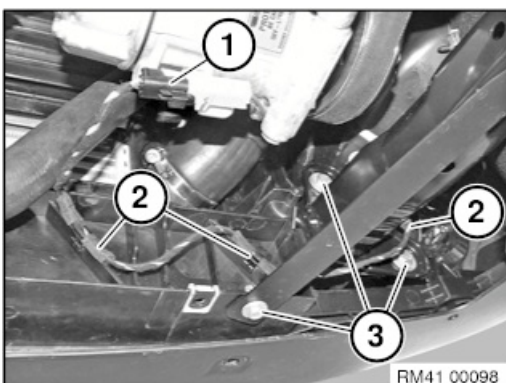
Repeat operation on right side of vehicle.



View of bottom left side.

Release screws (1).

Tightening torque 51 11 4AZ/ 9AZ



View of bottom right side.

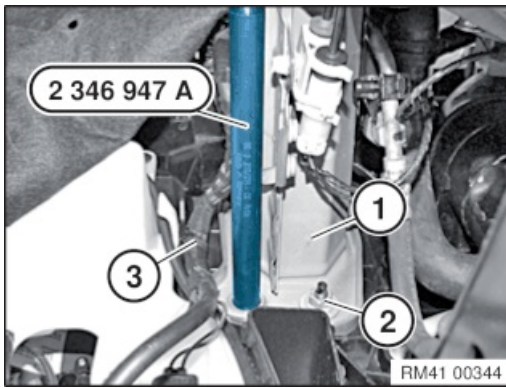
Disconnect plug connections (1) on A/C compressor.

Release wiring harness (2).

Loosen screws (3).

Tightening torque 51 11 4AZ/ 9AZ





General view of bottom, left side.

US version only:

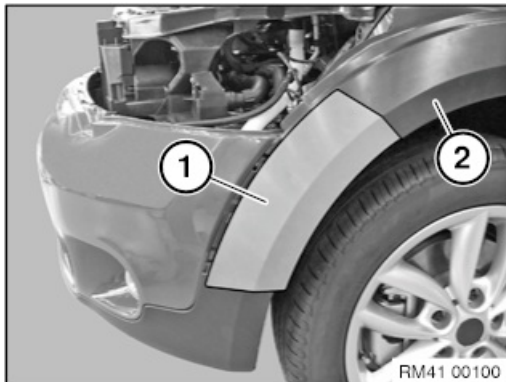
Remove both front acceleration sensors.

Insert special tool 2 346 947 (A) in recess on engine support (1) and screw onto front panel.

Slacken nut (2).

Release wiring harness (3) from front panel and engine support (1).

Repeat operation on right side of vehicle.

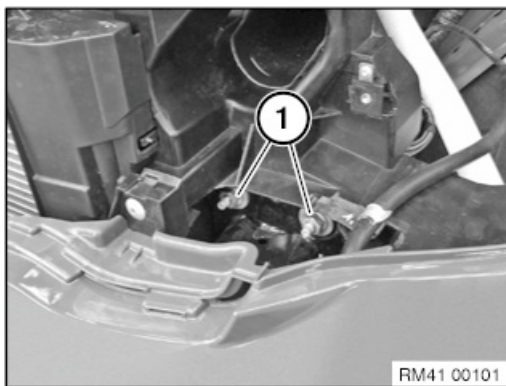


Attention!

Risk of damage!

Mask wheel arch trim (2) in area (1) using plastic adhesive tape.

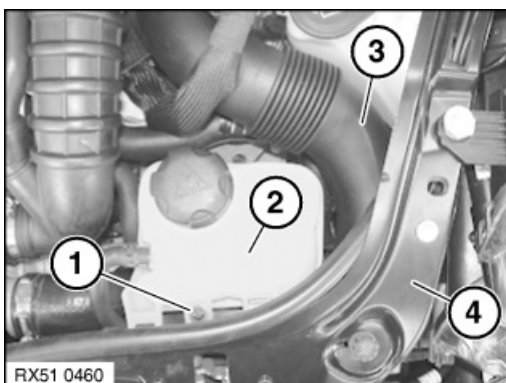
Repeat operation on right side of vehicle.



Release screws (1).

Tightening torque 51 11 3AZ

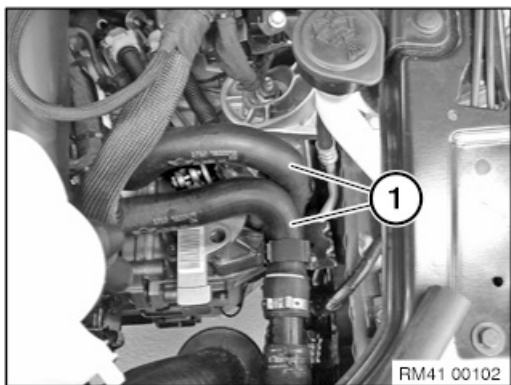
Repeat operation on right side of vehicle.



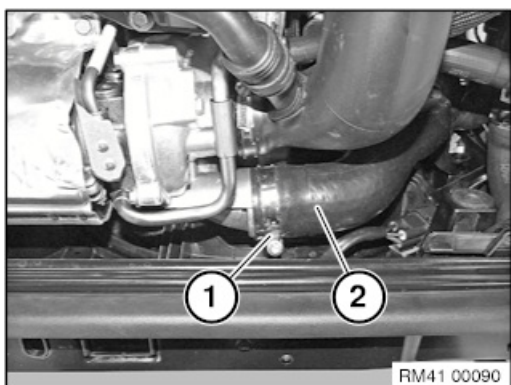
Undo bolt (1) and place coolant expansion tank (2) to one side.

Release and remove intake port (3) from lock bracket (4) and from air filter housing.

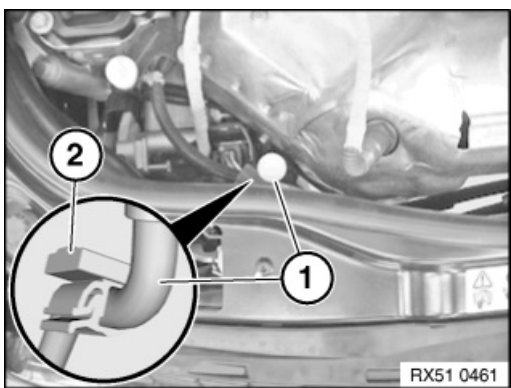




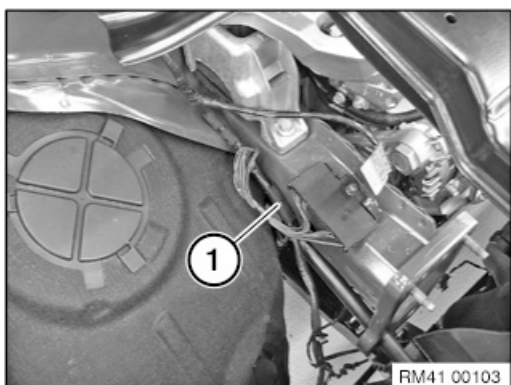
Release both coolant hoses (1) from the holders.



Only version with exhaust turbocharger:
Release hose clamp (1) and detach hose (2).

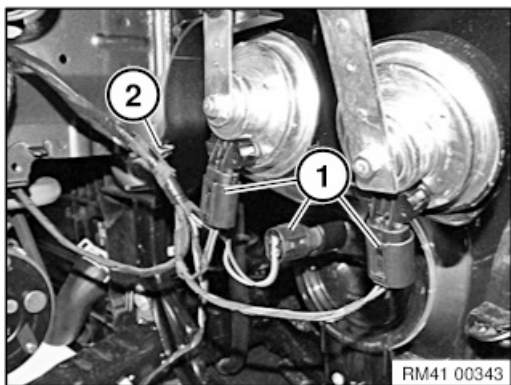


Version with A/C system only:
Unclip refrigerant line (1) from holder (2).

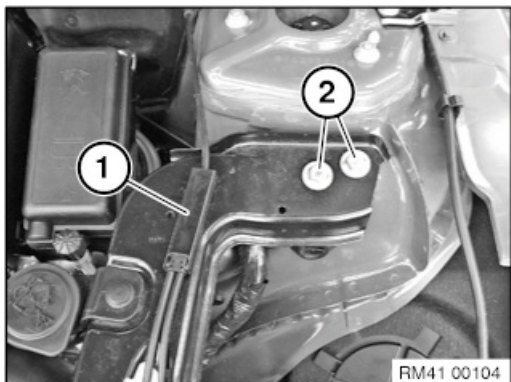


Release wiring harness (1) from engine support.
Repeat operation on other side of vehicle.

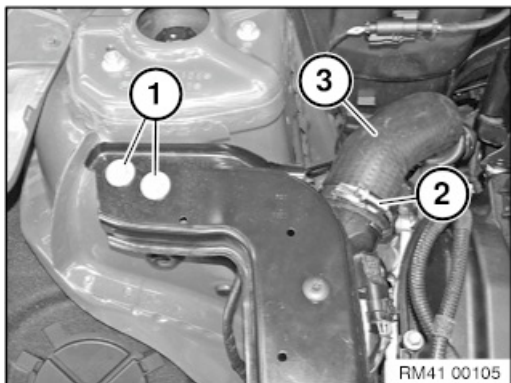




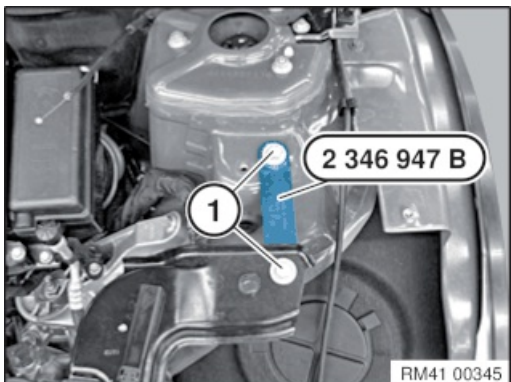
Unlock plug-in contacts (1) and disconnect.
Release wiring harness at attachment point (2).



Open clutch (1) and unhook Bowden cable for bonnet release.
Unfasten screws (2).
Tightening torque, 51 11 7AZ.



Release screws (1).
Tightening torque 51 11 7AZ
Only version with exhaust turbocharger:
Release clamp (2) and detach air duct (3).
Pull front panel approx. 10 cm forwards and if necessary pay attention to further cable clips.



Insert special tool 2 346 947 (B) on the left and right and screw in place (1).

Repeat operation on other side of vehicle.

Installation note:

To ensure that front panel (1) is correctly seated, slide panel on left and right uniformly towards rear.

With a second person helping, slide front panel into position and secure.

When installing, pay attention to retaining tabs on headlight.



Installation note:
Adjust headlight.



**Special tools required:**

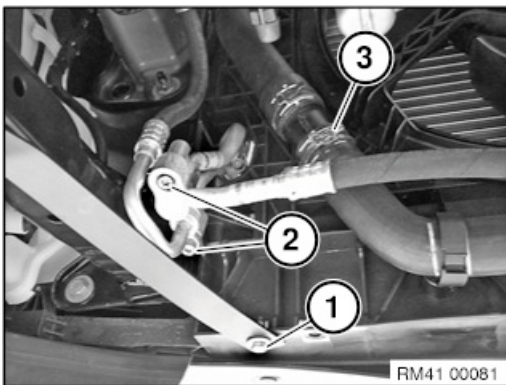
- 17 2 052
- 17 2 051

**Necessary preliminary tasks:**

- Clamp off battery
- Drain coolant
- Remove coolant expansion tank
- Remove underbody protection
- Remove front bumper panel
- Remove both wheel arch liners

Version with A/C system only:

- Drain air conditioner

Bottom left side:

Release screw (1).

Tightening torque 51 11 9AZ

Release clamp (3) for cooling water hose with special tool 17 2 052 .

Version with A/C system only:

Loosen screws (2) for A/C lines and pull off lines.

Close open lines.

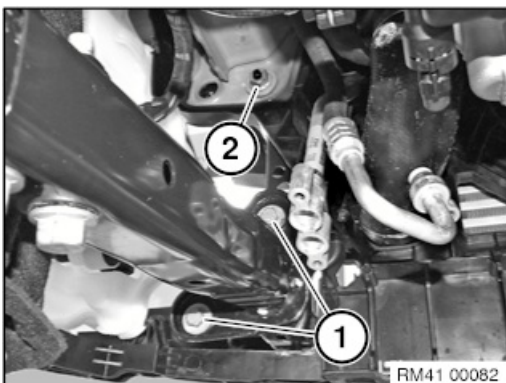
Installation note:

Replace O-rings on both connections and coat with refrigerant oil.

Tightening torque 64 53 1AZ

Important!

If air conditioner has been opened for more than 24 hours, dryer flask must be replaced



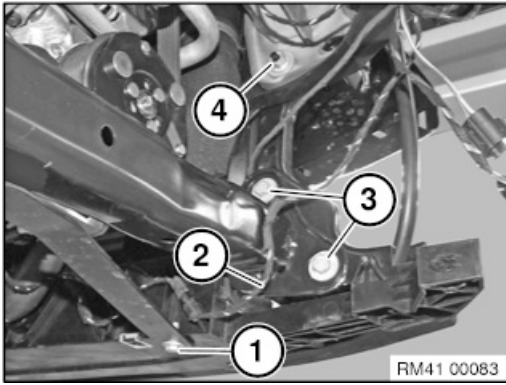
Release screws (1).

Tightening torque 51 11 4AZ.

Slacken nut (2).

Tightening torque 51 11 3AZ.





Bottom right side:

Release screw (1).

Tightening torque 51 11 9AZ.

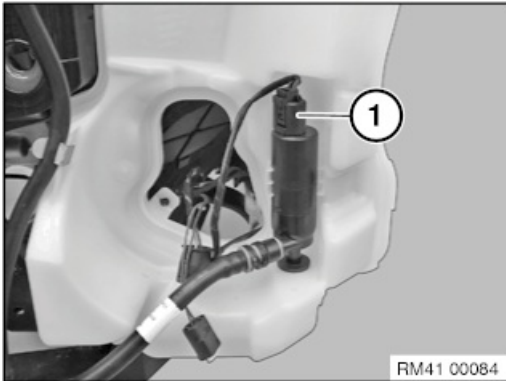
Release wiring harness (2) from front panel and side member.

Release screws (3).

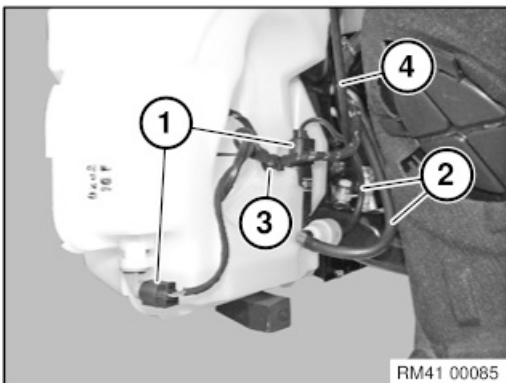
Tightening torque 51 11 4AZ.

Slacken nut (4).

Tightening torque 51 11 3AZ.



Unlock connector (1) and remove.

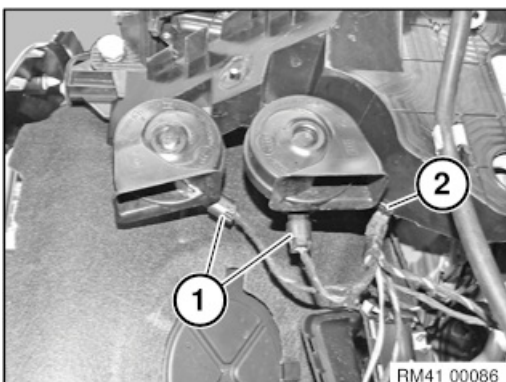


Unlock connector (1) and remove.

Disconnect hoses (2).

Release wiring harness (3) from container.

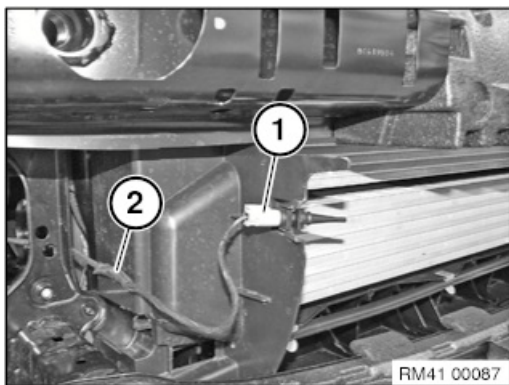
Detach hose (4) for window washer system at the attachment points.



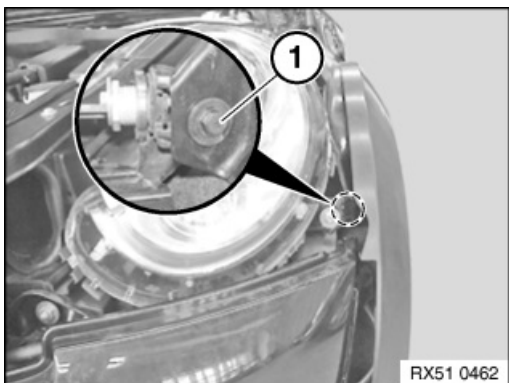
Unlock connector (1) for horn and disconnect.

Release wiring harness at attachment point (2).

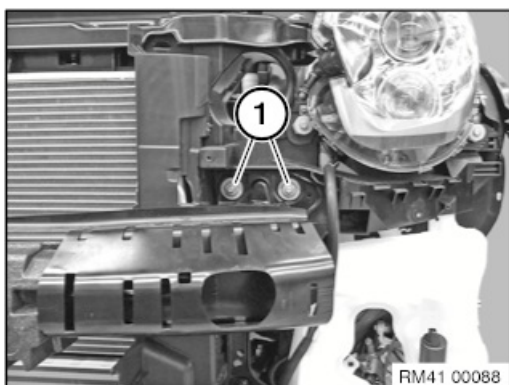




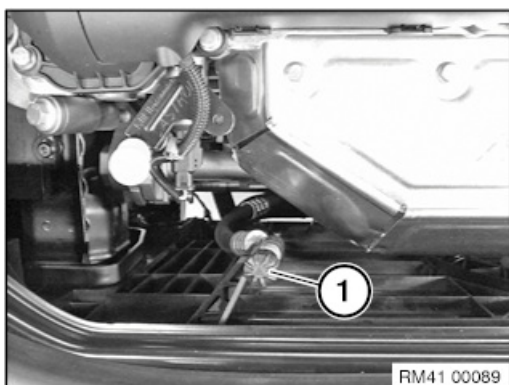
Unlock connector (1) for temperature sensor (1) and disconnect.
Pull wiring harness (2) off of air duct.



Release screw (1) on side wall.
Tightening torque 41 35 2AZ.
Repeat operation on other side.

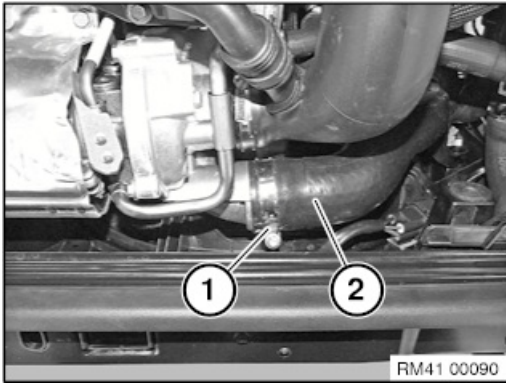


Unscrew nuts (1).
Tightening torque 51 11 3 AZ.
Repeat above step on left side.



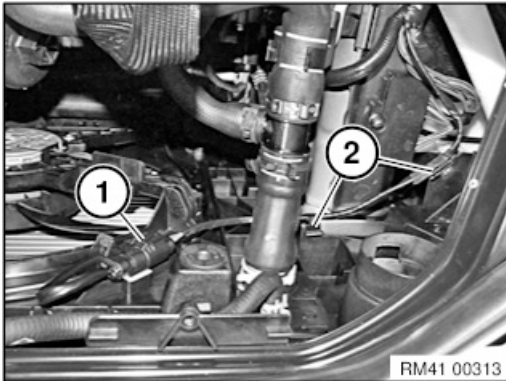
Version with A/C system only:
Unclip line for air conditioning (1) from holder.





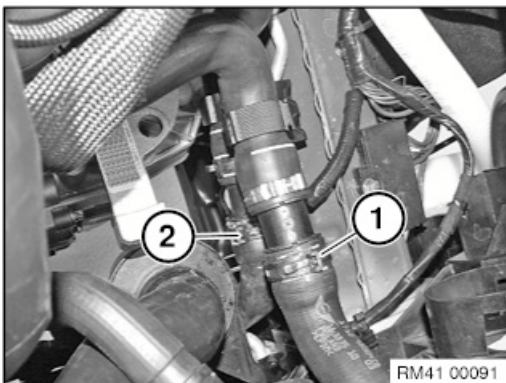
Version with exhaust turbocharger only:

Release hose clamp (1) and detach hose (2).



Unlock plug connection (1) for fan and disconnect.

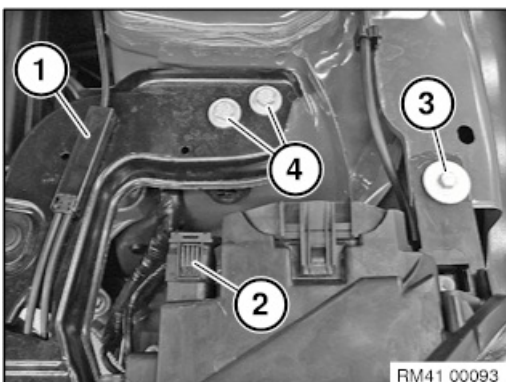
Detach wiring harness at attachment points (2).



Release clamp (1) using special tool 17 2 051 and disconnect the coolant hose.

Version with exhaust turbocharger only:

Release clamp (2) using special tool 17 2 051 and disconnect the coolant hose.



Open clutch (1) and detach Bowden cable for hood/bonnet release.

Unlock plug connection (2) for headlight and disconnect.

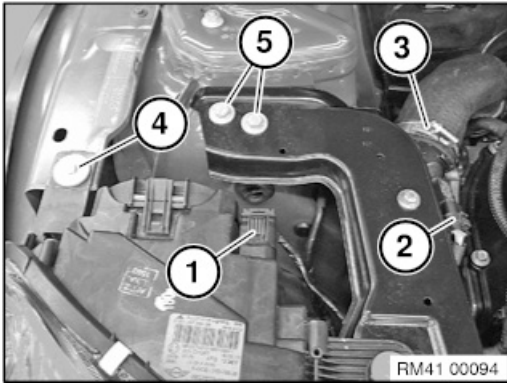
Release screw (3).

Tightening torque 63 12 1AZ.

Release screws (4).

Tightening torque 51 11 7 AZ.





Unlock plug connection (1) for headlight and disconnect.

Version with exhaust turbocharger only:

Unlock plug connection (2) for charge air pressure sensor and disconnect.

Release clamp (3) and pull off charge air hose.

Release screw (4).

Tightening torque 63 12 1AZ.

Release screws (5).

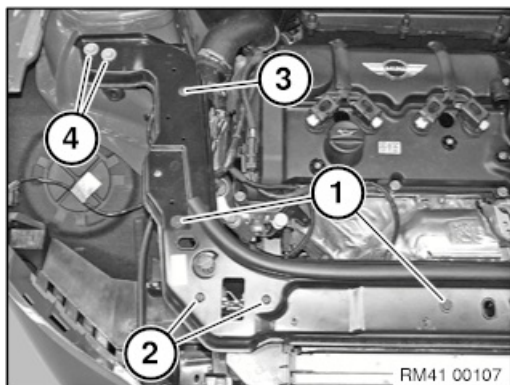
Tightening torque 51 11 7 AZ.

Remove front panel.



**Necessary preliminary work:**

- Remove centre radiator grille
- Remove headlight



Release screws (1).

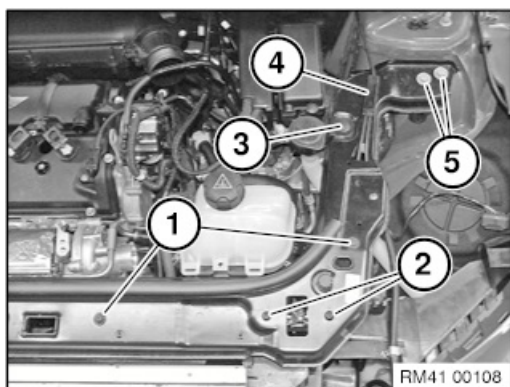
Undo screws (2) for bonnet locks .

Only vehicles with turbocharger:

Lift out expanding rivet (3).

Release screws (4).

Tightening torque 51 11 7AZ



Release screws (1).

Undo screws (2) for bonnet locks .

Lift out expanding rivet (3).

Release pull cable (4) for bonnet locks.

Undo screws (5) and remove lock bridge.

Tightening torque 51 11 7AZ

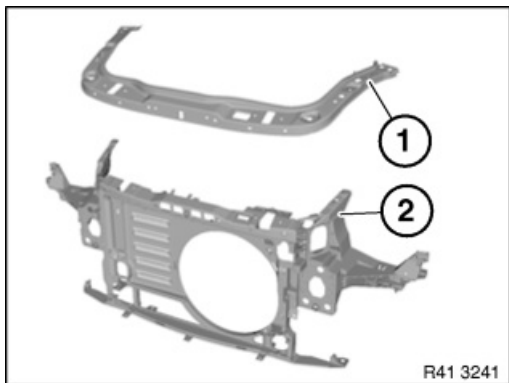




Read contents of Body, General.

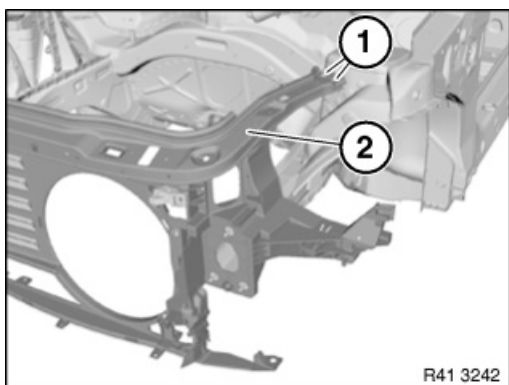
For stripping and rigging operations, refer to texts on KSD CD (job number 41 33 040).

The graphics are schematic representations and are to be applied to the relevant vehicle type.



The following body new parts are required (refer to Electronic Parts Catalogue)

- (1) Lock bridge
- (2) Front panel



Remove support for bumper trim.

Release screws (1) on both sides of vehicle.

Tightening torque 51 11 7AZ.

Release screws (2) on both sides of vehicle.

Tightening torque 41 33 4AZ.



41 ... 0 Notes on the repair technique used in the main group 41

Two different repair techniques are used in body repair.

These are welding and bonding/riveting.

If the repair instructions do not specify a repair technique, then welding must **always** be used.

The bonding/riveting repair technique is **always** described in detail in the repair instructions.

Quality standards must be met.



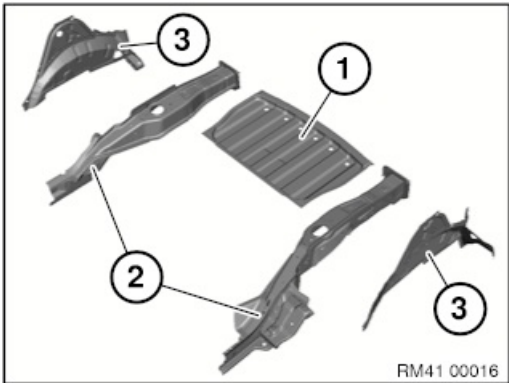
41 12 535 Replacing luggage compartment floor and both side members (tail panel removed)



Read contents of Body, General.
Strip down vehicle
Spot-weld bonding is used on this vehicle. Observe specific procedure.
Place vehicle on straightening bench.



Observe procedure for (repair stage 3)!



Following new body parts are required (see Electronic Parts Catalogue):

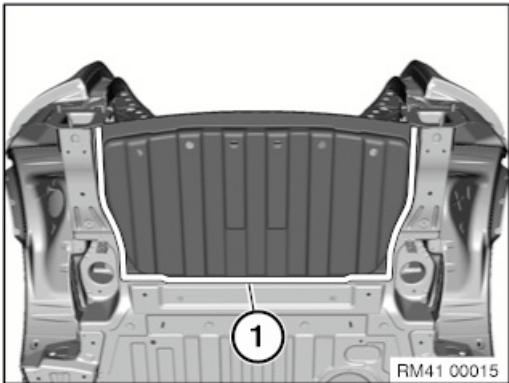
- (1) Luggage compartment floor, rear
- (2) Side member, rear left and right
- (3) Rear wheel arch, inner half, left and right

Following consumables are required:

Material	Quantity
Adhesive K5a	2
Blind rivets N6	16
EMC screws	4
Cleaning agent R1	1
Sealant D1	

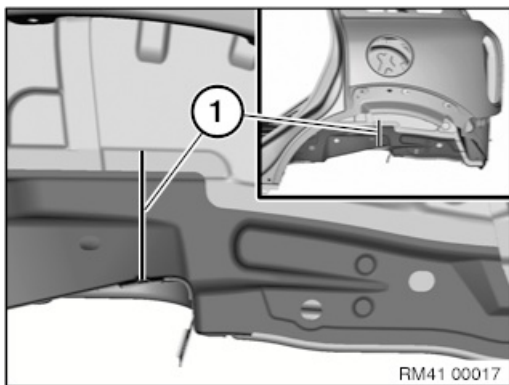


Removal of luggage compartment floor and both side members
Most of operation is described on the left side. Right side identical.

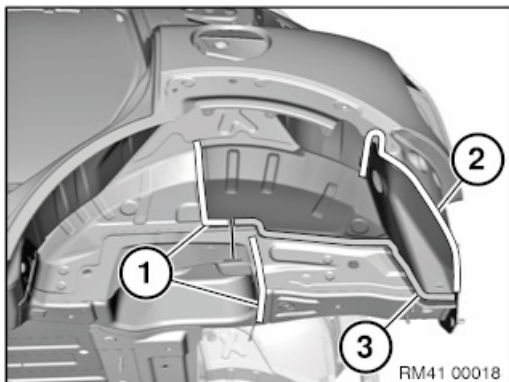


View from below.
Open spot-welded adhesive joints in area (1)
Remove the luggage compartment floor.

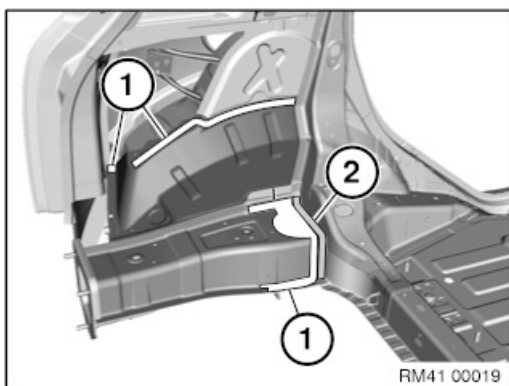




Mark severance cut (1) as pictured and cut. **Important!**
Cut outer panel only.



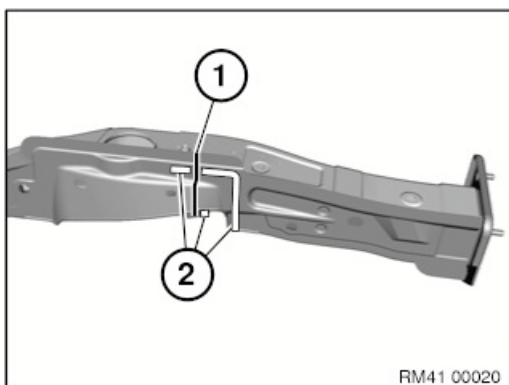
Open welded connections in areas (1).
Open spot-welded adhesive joints in area (2)
Installation note:
Weld new components in area (3) additionally.



Open welded connections in areas (1) and (2).
Remove side member and wheel arch.



New part preparation

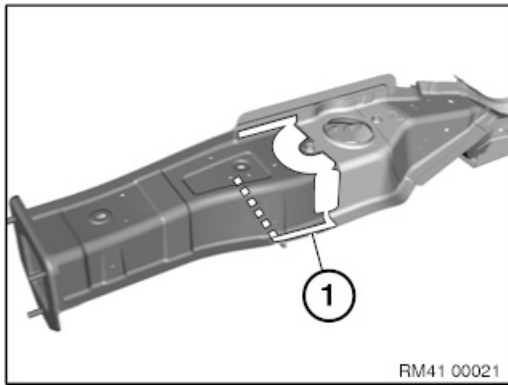


Mark severance cut (1) in accordance with vehicle and cut.

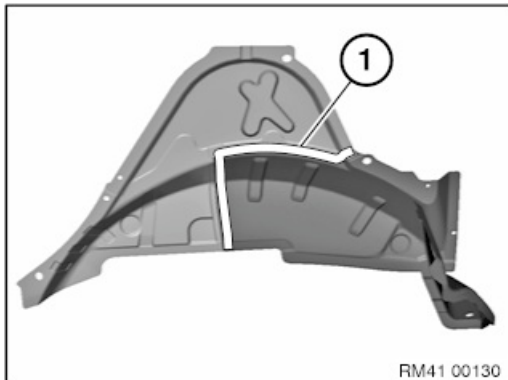
Important!
Cut outer panel only.

Open welded connections in areas (2).

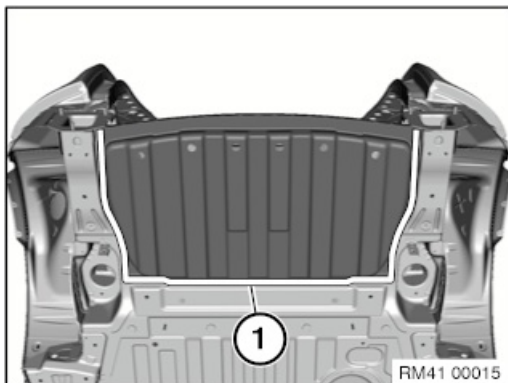




Open welded connections in areas (1).
Remove components not needed.



Open welded connections in area (1).
Remove components not needed.
Adjust new parts to fit with alignment bracket or universal mount and secure.



Fit luggage compartment floor from underneath and adjust in conjunction with tail panel and secure.
Set 16 4.2 mm dia. bore holes for blind rivets in area (1).
Remove new part and deburr holes.



Important!
Do not grind new parts and body in area of bonding surfaces.

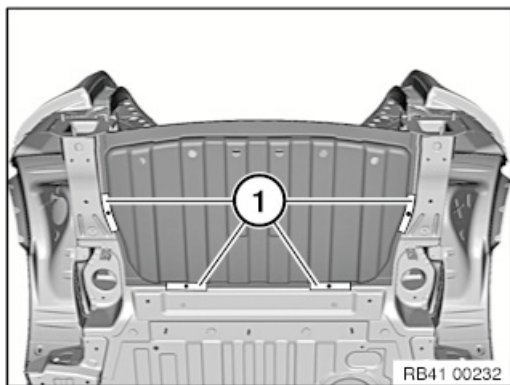


Installation of side members, inner wheel arch halves
Install new parts with alignment bracket or universal mount and weld.



Installation of luggage compartment floor:
Clean all bonding surfaces with cleaning agent R1.
Apply adhesive to bonding surfaces.
Install new part and rivet with blind rivets





After hardening of the adhesive, install 4 EMC screws in the areas (1).



41 11 751

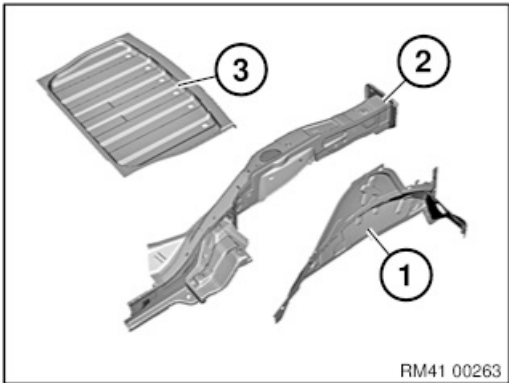
Replacing luggage compartment floor and side member on left
(left side wall and tail panel removed)



Read contents of Body, General.
Strip down vehicle
Spot-weld bonding is used on this vehicle. Observe specific procedure.
Place vehicle on straightening bench.



Follow procedure for repair stage 3.



Following new body parts are required (see Electronic Parts Catalogue):

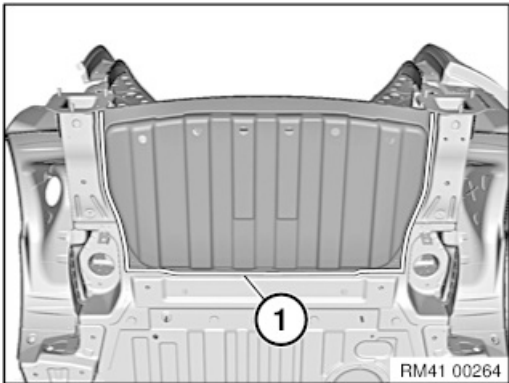
- (1) Wheel arch, rear, inner half, left
- (2) Frame side member, left rear
- (3) Luggage compartment floor, rear

Following consumables are required:

Material	Quantity
Adhesive K5a	2
Blind rivets N6	16
EMC screws	4
Cleaning agent R1	1
Sealant D1	

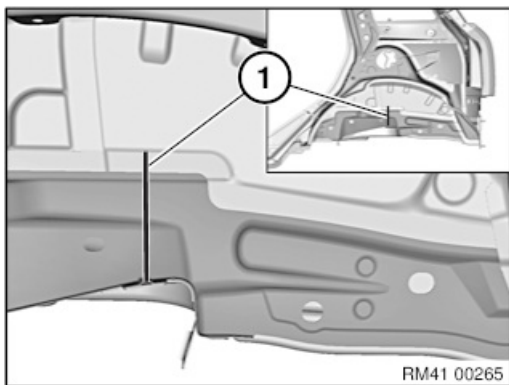


Removal

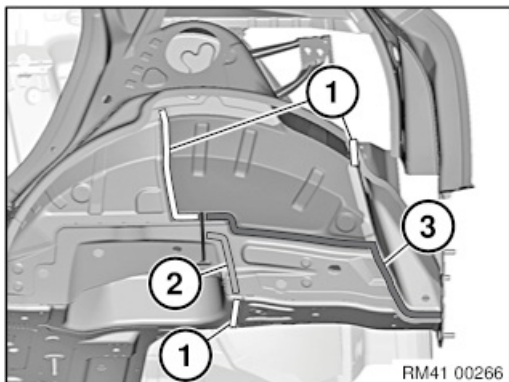


View from below.
Open spot-welded adhesive joints in area (1)
Remove the luggage compartment floor.

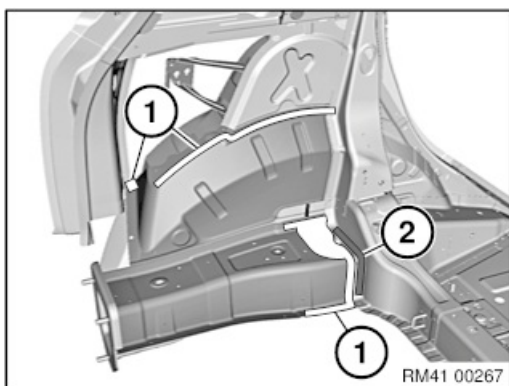




Mark severance cut (1) as pictured and cut. **Important!**
Cut outer panel only.



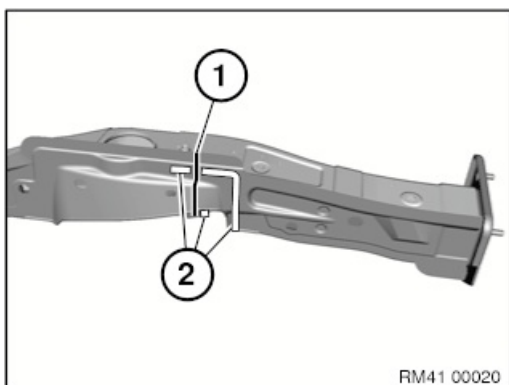
Open welded connections in areas (1).
Open spot-welded adhesive joints in area (2)
Installation note:
Weld new components in area (3) additionally.



Open welded connections in areas (1) and (2).
Remove side member and wheel arch.



New part preparation

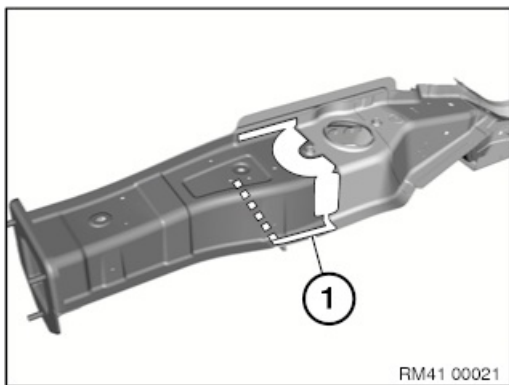


Mark severance cut (1) in accordance with severance cut on vehicle and cut.

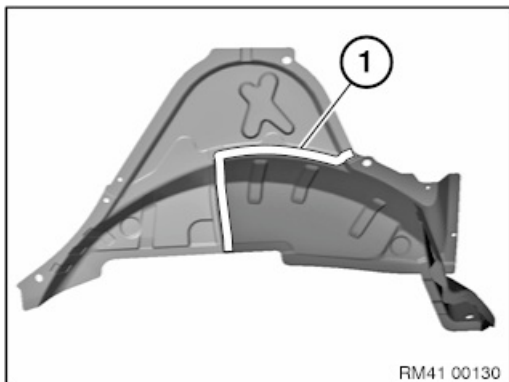
Important!
Cut outer panel only.

Open welded connections in areas (2).

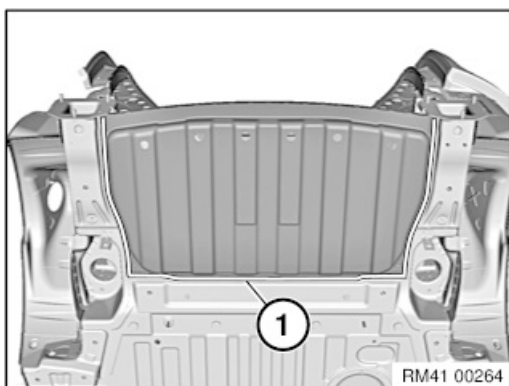




Open welded connections in areas (1).
Remove components not needed.



Open welded connections in area (1).
Remove components not needed.
Adjust new parts to fit with alignment bracket or universal mount and secure.



Fit luggage compartment floor from underneath and adjust in conjunction with tail panel and secure.
Set 16 4.2 mm dia. bore holes for blind rivets in area (1).
Remove new part and deburr holes.



Important!

Do not grind new part for the luggage compartment floor and body in area of bonding surfaces!



Installing side members and wheel arch

Install new parts with alignment bracket or universal mount and weld.

- Side member, rear left
- Wheel arch, rear, inner half



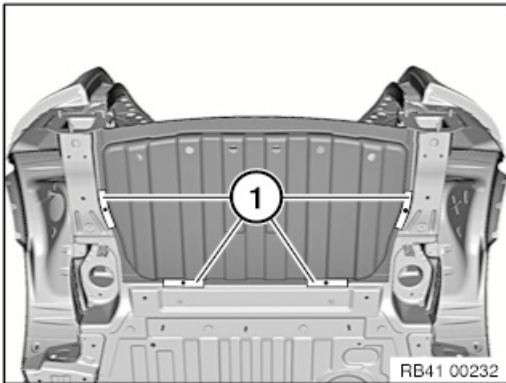


Installation of luggage compartment floor

Clean all bonding surfaces with cleaning agent R1.

Apply adhesive to bonding surfaces.

Install the luggage compartment floor and rivet with blind rivets.



After hardening of the adhesive, install 4 EMC screws in the areas (1).



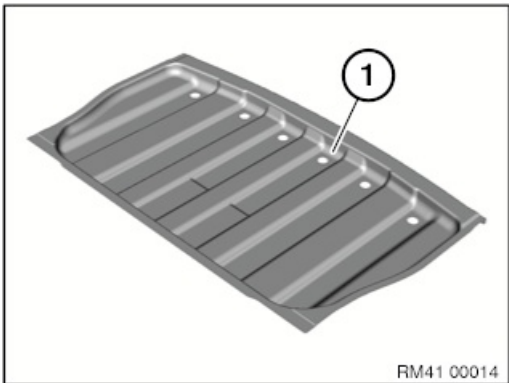
Replacing middle luggage compartment floor (tail panel has been



Read contents of Body, General.
Strip down vehicle



Follow procedure for repair stage 2.



Following new body parts are required (see Electronic Parts Catalogue):

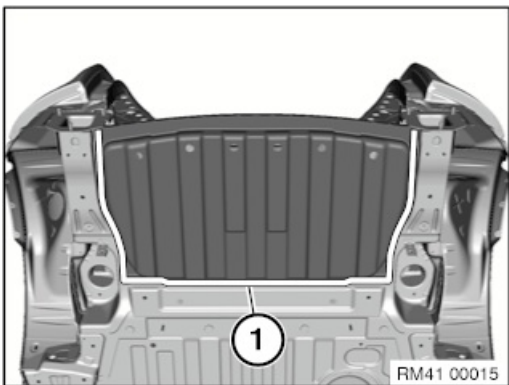
- (1) Luggage compartment floor

Following consumables are required:

Material	Quantity
Adhesive K5a	2
Blind rivets N6	16
EMC screws	4
Cleaning agent R1	1
Sealant D1	



Removal of luggage compartment floor



View from below.

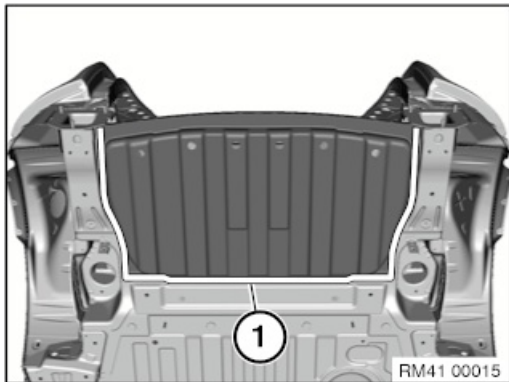
Open spot-welded adhesive joints in area (1)

Remove the luggage compartment floor.



New part preparation





Fit luggage compartment floor from underneath and adjust in conjunction with tail panel and secure.

Set 16 4.2 mm dia. bore holes for blind rivets in area (1).

Remove new part and deburr holes.



Important!

Do not grind new parts and body in area of bonding surfaces.



Installation of luggage compartment floor

Clean all bonding surfaces with cleaning agent R1.

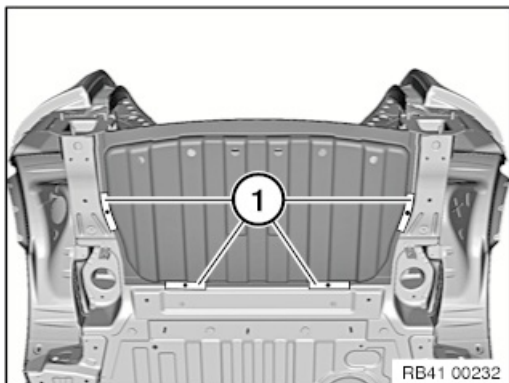
Apply adhesive to bonding surfaces.

Install new part and rivet with blind rivets.



Remove excess adhesive. **Important!**

Do not use any cleaning agents containing solvents.



After hardening of the adhesive, install 4 EMC screws in the areas (1).



41 34 060

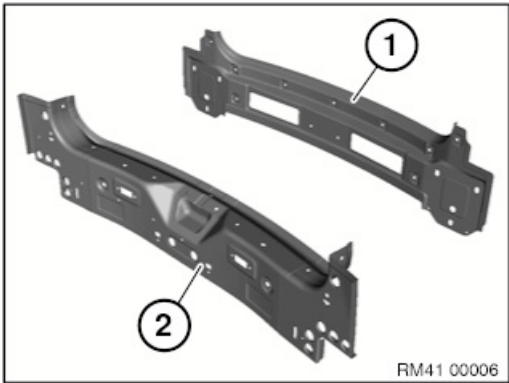
Replacing outer and inner tail panel sections



Read contents of Body, General.
Strip down vehicle



Procedure observe repair stage 2 !



Following new body parts are required (see Electronic Parts Catalogue):

- (1) Rear trim panel
- (2) Rear trim, inner

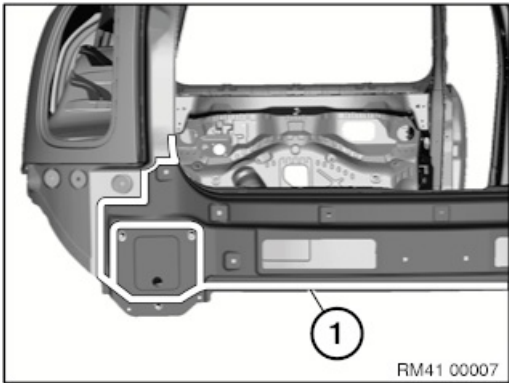
Following consumables are required:

Material	Quantity
Adhesive K5b	1
Blind rivets N3	24
Punch rivets N4	27
EMC screws	10
Cavity sealing wax remover	
Cleaning agent R1	1
Sealant D1	



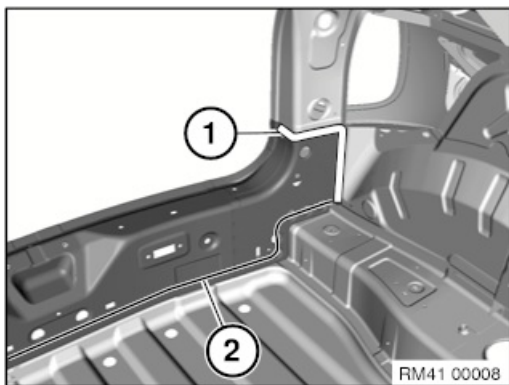
Removing the tail panel

Operation described predominantly on the left side. Right side identical.

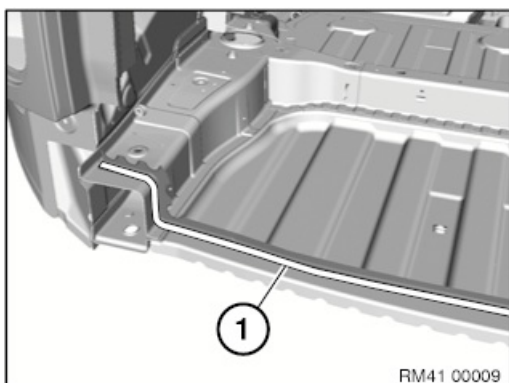


Open welded connections in area (1).





Open welded connections in area (1).
Roughly mark severance cut (2) and cut.
Remove tail panel.

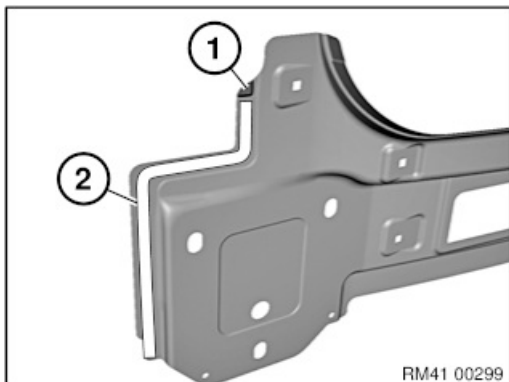


Open welded connections in area (1). *Note:*
Schematic diagram shown without cross member mounting for bumper for better overview.

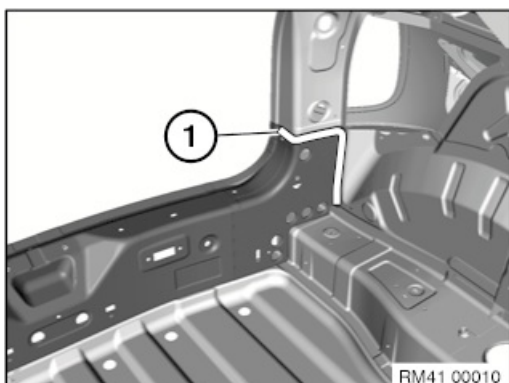


New part preparation

Operation described predominantly on the left side. Right side identical.

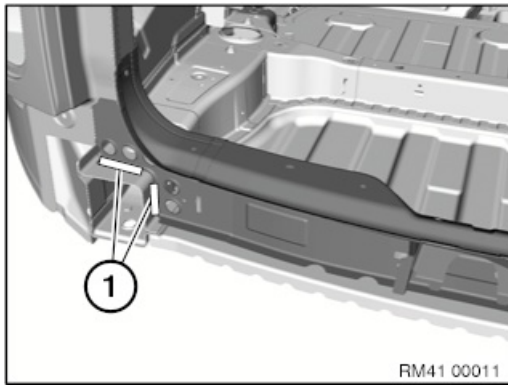


Disconnect section (1) according to schematic diagram.
Changed joining sequence: New part is installed from outside in the area (2) with overlap.
Set area (2) on the new part and on the vehicle.

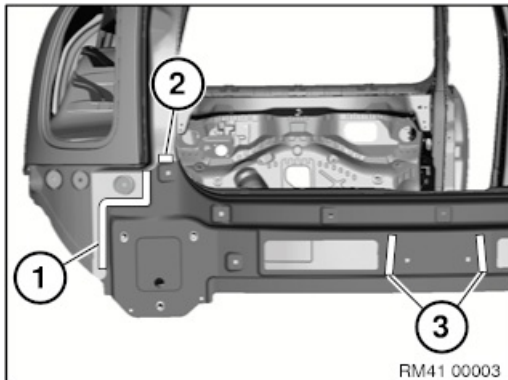


Adjust rear trim panel and outer skin rear trim panel to fit and secure them.
Set 4 4.2 mm diameter bore holes for blind rivets in area (1).





Set two 4.2 mm dia. holes for blind rivets in areas (1). *Note:* Schematic diagram shown without cross member mounting for bumper for better overview.

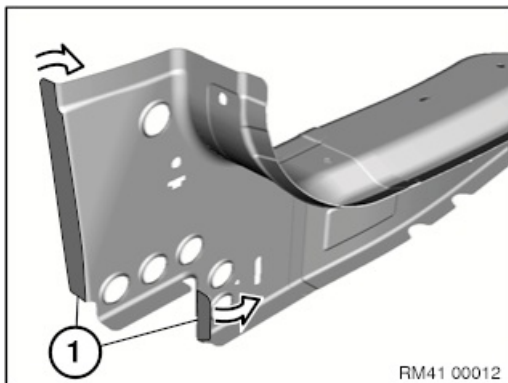


Changed joining sequence: Fit new part from the outside in area (1) and install with overlap.

In areas (1) to (3), create 4.2 mm dia. bore holes for blind rivets N3.

Area	Number
1	3 of
2	1 of
3	4

Remove new part again and deburr bore holes.



Bend adhesive flanges (1) approx. 30° inwards. *Note:* Also apply adhesive to these adhesive areas after installing rear trim panel.

Then bend back the adhesive flanges.



Important!

Do not grind new parts and body in area of bonding surfaces.



Installing the tail panel

Clean **all** bonding surfaces on new part and on vehicle with cleaning agent R1.

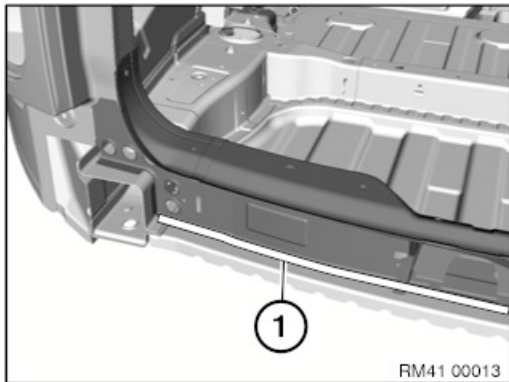
Apply adhesive to bonding surfaces.

Attach rear trim panel (inner panel) and rivet using blind rivets.

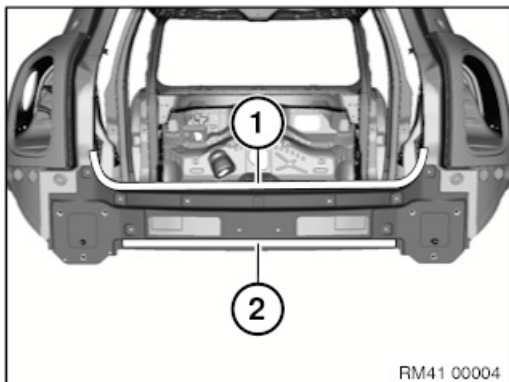
Note:

When inserting rear trim panel, make sure there is sufficient adhesive on bonding surfaces.





In area (1) use a total of 9 punch rivets N4. *Note:* Schematic diagram shown without cross member mounting for bumper for better overview.

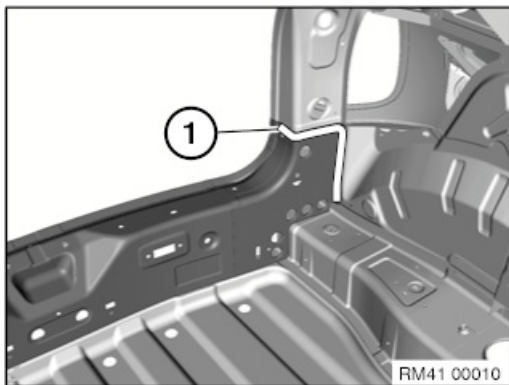


Install rear trim panel outer skin and rivet with blind rivets. Use 18 punch rivets N4 in areas (1) and (2).

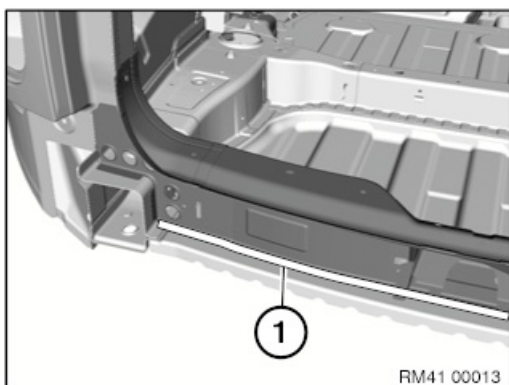
Area	Number
1	11
2	7



Mount support for bumper panel to secure rear trim panel. **Important!** Prevent emerging adhesive from coming into contact with cross-member!

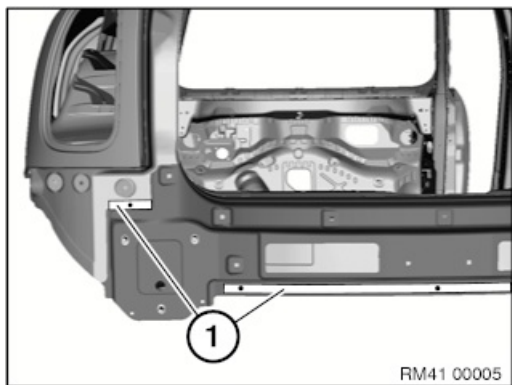


Fit an EMC screw after adhesive has hardened in area (1).



After hardening of the adhesive in area (1), install 3 EMC screws. *Note:* Schematic diagram shown without cross member mounting for bumper for better overview.





After hardening of the adhesive in areas (1), install 5 EMC screws.



41 34 038

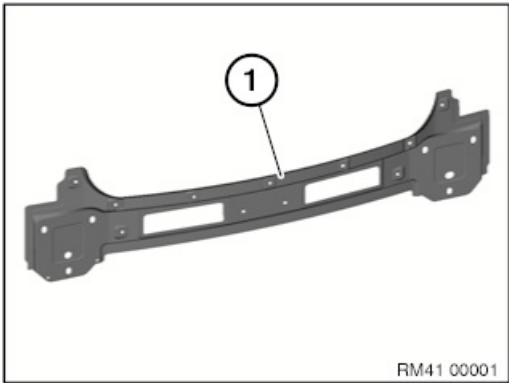
Replacing outer tail panel section



Read contents of Body, General.
Strip down vehicle



Procedure observe repair stage 2 !



Following new body parts are required (see Electronic Parts Catalogue):

- (1) Rear trim, outer skin

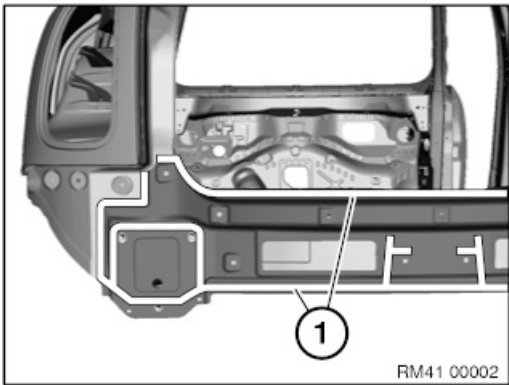
Following consumables are required:

Material	Quantity
Adhesive K5a	2
Blind rivets N3	12
Punch rivets N4	16
EMC screws	5
Cavity sealing wax remover	
Cleaning agent R1	1
Sealant D1	



Removing rear trim panel

Operation described predominantly on the left side. Right side identical.



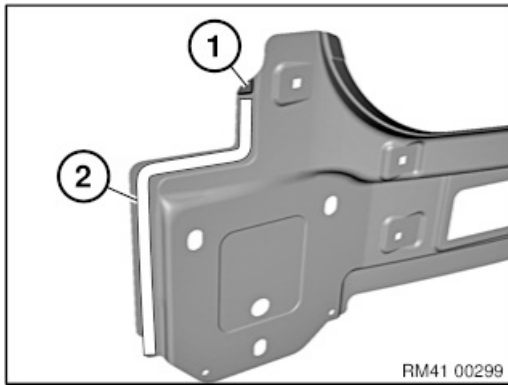
Open welded connections in areas (1).
Remove rear trim panel.



New part preparation

Operation described predominantly on the left side. Right side identical.

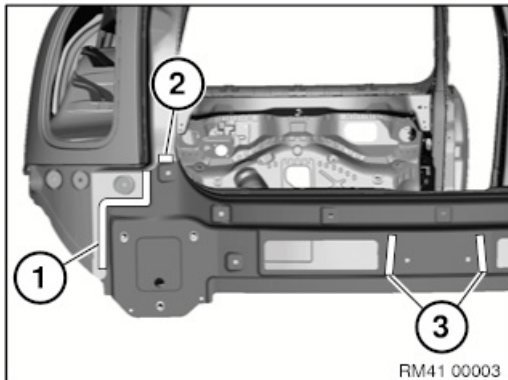




Disconnect section (1) according to schematic diagram.

Changed joining sequence: New part is fitted and installed in the area (2) from outside.

Set area (2) on the new part and on the vehicle.



Adjust rear trim panel to fit and secure.

Changed joining sequence: Work new part into position from outside at areas (1) and install.

In areas (1) to (3), create 4.2 mm dia. bore holes for blind rivets N3.

Area	Number
1	3 of
2	1 of
3	4

Remove new part again and deburr bore holes.

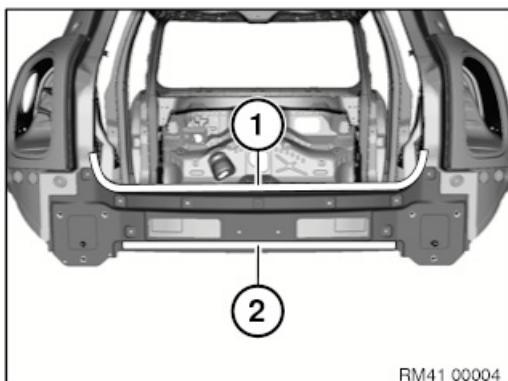


Important!

Do not grind new part and body in area of bonding surfaces.



Installing rear trim panel



Clean all bonding surfaces on new part and on vehicle with cleaning agent R1.

Apply adhesive to bonding surfaces.

When inserting rear trim panel, make sure there is sufficient adhesive on bonding surfaces.

Install rear trim panel and rivet with blind rivets N3.

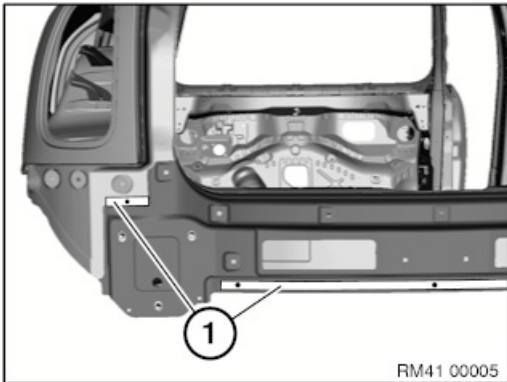
In areas (1) and (2) rivet rear trim panel with N4 punch rivets.

Area	Number
1	9
2	7





Mount support for bumper panel to secure rear trim panel. **Important!**
Prevent emerging adhesive from coming into contact with cross-member!



After hardening of the adhesive in areas (1), install a total of 5 EMC screws.





Note:

Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

- Remove and install headlining (job number: 51 44 001)
- Remove roof rails on left and right (job number: 51 13 305)
- Remove panorama glass roof (job number: 54 13 085)
- Remove airbag holder on left and right (job number: 54 10 016)
- Remove and install windscreen (job number: 51 31 000)
- Remove both rear seats (job number: 52 26 005)
- Luggage compartment wheel arch panel (job number: 51 47 151)
- Remove left side window (job number: 51 36 070)
- Remove right side window (job number: 51 36 070)
- Remove roof aerial (job number: 65 20 022)
- Remove tailgate (job number: 41 62 000)
- Remove tailgate hinges (job number: 41 62 070)
- Partially detach tailgate seal



41 12 557 Stripping operations - Replacing centre luggage compartment floor, all-wheel drive vehicle (tail panel removed)



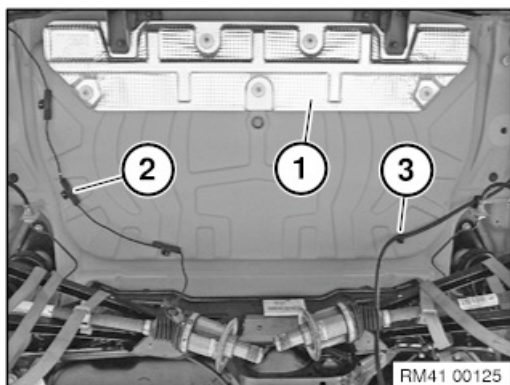
Note:

Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

Vehicles with four-wheel drive

- Remove rear axle final drive (job number: 33 10 016)



Remove heat shield (1).

Release wiring harness (2) from luggage compartment floor.

Release vent hose (3) from luggage compartment floor.



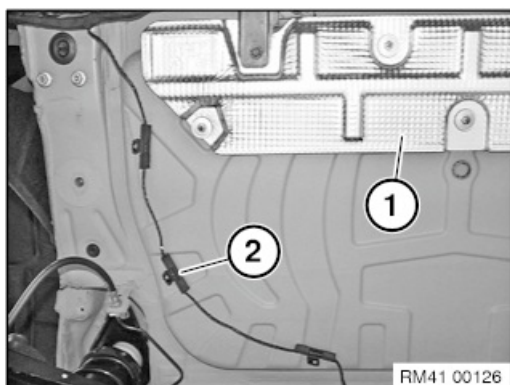
41 12 557 Stripping operations - Replacing luggage compartment floor, middle (tail panel removed)



Note:

Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.



Remove heat shield (1).

Release wiring harness (2) from luggage compartment floor.





Note:

Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

- Disconnect negative battery cable (job number: 61 20 900)
- Remove bumper trim (job number: 51 12 156)
- Remove bumper support (job number: 51 12 050)
- Remove left and right holder for bumper (job number: 51 12 801)
- Remove guide for bumper at rear center (job number: 51 12 825)
- Remove cover on tail panel at top (FR number: 51 46 050)
- Remove luggage compartment floor trim panel (FR number: 51 47 101)
- Remove and install left and right luggage compartment wheel arch panels (FR number: 51 47 151)
- Remove tailgate lock (job number: 51 24 100)
- Remove left and right tail lights (job number: 63 21 170)
- Completely remove exhaust system (job number: 18 00 020)
- Remove rear heat shield
- Partially detach tailgate seal
- Partially release wiring harness



*Note:*

Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

- Remove and install headlining (job number: 51 44 001)
- Remove roof rails on left and right (job number: 51 13 305)
- Remove and install windscreen (job number: 51 31 000)
- Remove both rear seats (job number: 52 26 005)
- Luggage compartment wheel arch panel (job number: 51 47 151)
- Remove left side window (job number: 51 36 070)
- Remove right side window (job number: 51 36 070)
- Remove roof aerial (job number: 65 20 020)
- Remove tailgate (job number: 41 62 000)
- Remove tailgate hinges (job number: 41 62 070)
- Partially detach tailgate seal



*Note:*

Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

- Disconnect negative battery cable (job number: 61 20 900)
- Remove bumper trim (job number: 51 12 156)
- Remove bumper support (job number: 51 12 050)
- Remove left and right holder for bumper (job number: 51 12 801)
- Remove guide for bumper at rear centre (job number: 51 12 825)
- Remove trim on tail panel at top (job number: 51 46 050)
- Remove and install left and right luggage compartment wheel arch panels (job number: 51 47 151)
- Remove tailgate lock (job number: 51 24 100)
- Partially detach tailgate seal
- Detach exhaust system in area of rear silencer (job number: 18 00 020)



41 ... 0 Notes on the repair technique used in the main group 41

Two different repair techniques are used in body repair.

These are welding and bonding/riveting.

If the repair instructions do not specify a repair technique, then welding must **always** be used.

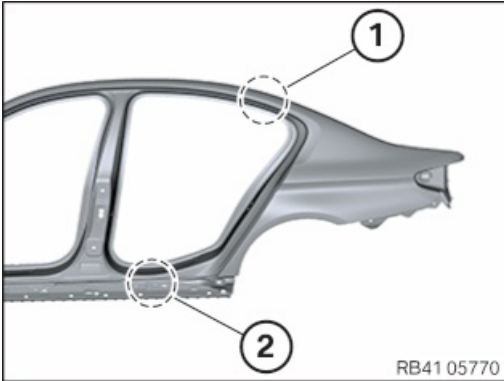
The bonding/riveting repair technique is **always** described in detail in the repair instructions.

Quality standards must be met.





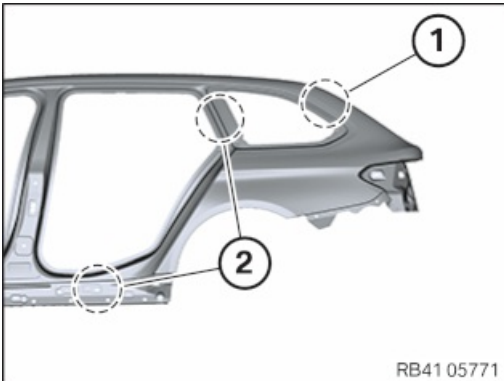
When replacing the rear side panel, reinforcement plates are bonded or welded on the separation points.



Applicable to Saloon, hatchback, Coupé.

Welding is done in area (1) (incl. water channel).

Bonding is done in area (2).



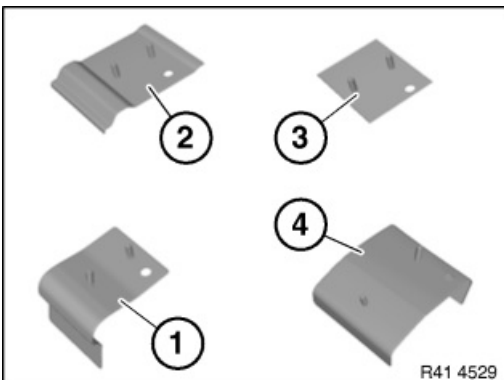
Applicable to Touring, X models, Gran Coupé, Gran Turismo.

Welding is done in area (1) (incl. water channel).

Bonding is done in areas (2).

Note:

The following graphics serve as general illustrations of reinforcement plate repair work. They apply to sectional repairs on the outer skin which are produced using the adhesive joining method.

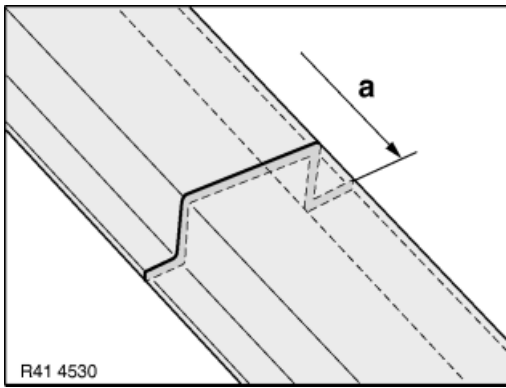


Overview of the reinforcement plates (for sourcing reference, see Electronic Parts Catalogue):

- (1) Reinforcement plate, sill
- (2) Reinforcement plate, C-pillar
- (3) Reinforcement plate, universal
- (4) Reinforcement plate, C- or D-pillar
- (5) Nuts (not shown)

- Plastic nut dia. 18 mm, part number 07 14 1 943 122
- Plastic nut \varnothing 22 mm, part number 07 14 7 169 847





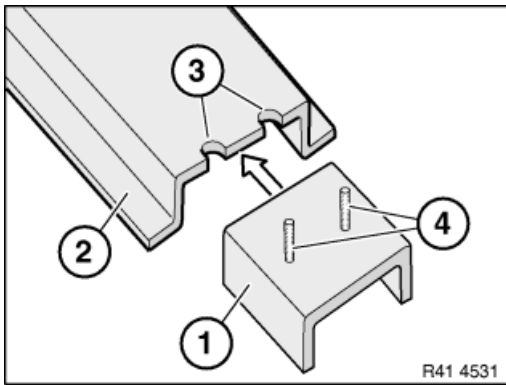
Mark side panel according to dimension a and detach it.



Preparation of the reinforcement plate (bonded or welded)

Some reinforcement plates are oversized.

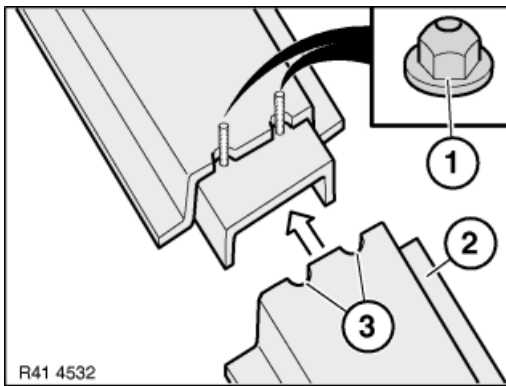
It may be necessary to rework the reinforcement plates at the edges or cut them to size until they rest against the outer skin free of tension.



Adjust reinforcement plate (1) to fit in component (2) on vehicle.

Make semicircular recesses (3) for the stud bolts (4).

Diameter of recesses approx. 10 - 12 mm.



Fix the reinforcement plate using plastic nuts (1).

Fit new part (2).

Make semi-circular recesses (3) in the new part.

Diameter of recesses approx. 10 - 12 mm.

Remove reinforcement plate.

Note:

Bonded reinforcement plates:

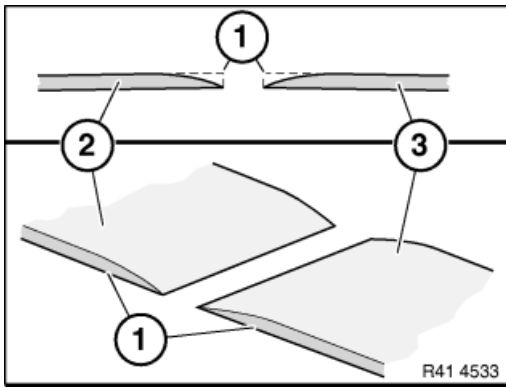
Width of joint between new part and component on vehicle approx. 5 - 8 mm (at least 30 mm flange width per side).

Welded reinforcement plates:

Width of joint between new part and component on vehicle approx. 2 - 3 mm.

Grind down to the metal in the area of the joint.





Carry out the following step only if the reinforcement plates are bonded.
Chamfer cutting edges (1) on joint by grinding.

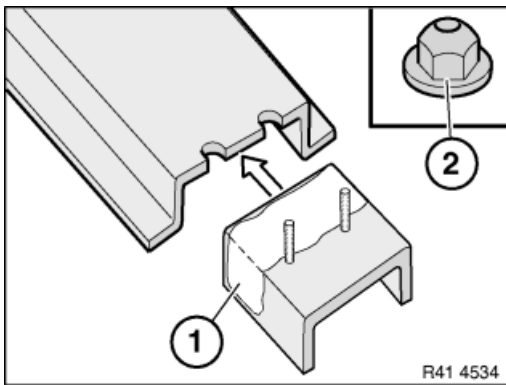
(2) Component on vehicle

(3) New part

If the cutting edges have not been sufficiently chamfered, there may be voids in the paintwork after painting.



Installing bonded reinforcement plate



Clean all bonding surfaces.

Apply the adhesive in area (1) on the reinforcement plate.

Apply more adhesive in the radii to avoid air pockets.

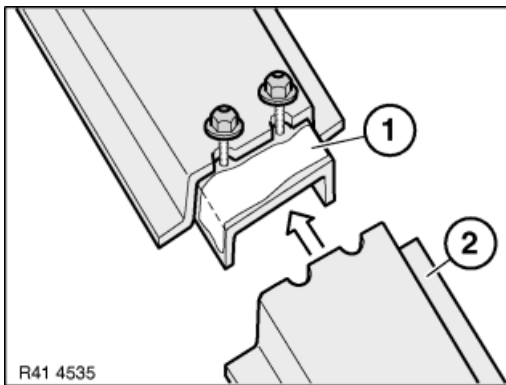
Apply additional adhesive to the outer skin around radii.

Slide the reinforcement plate carefully into the component on the vehicle and fix plastic nuts (2).

Screw on the nuts with only a few turns.

Attention!

When joining the reinforcement plate, make sure that there is sufficient adhesive on the bonding surfaces!



Apply the adhesive on bonding surface (1) of the reinforcement plate.

Apply more adhesive in the radii to avoid air pockets.

Apply additional adhesive to the outer skin around radii.

Fit new part (2).

Align new part to adjoining component and secure with gripping pliers.

First tighten the plastic nuts at the radii.

Only then tighten all the plastic nuts in the flat areas.

Tightening torque 41 14 1AZ.

Attention!

Check that the transition of the components is OK at the separation point. Corrections can only be made before the adhesive has hardened. Straightening at a later stage is not possible.

After adhesive has hardened:

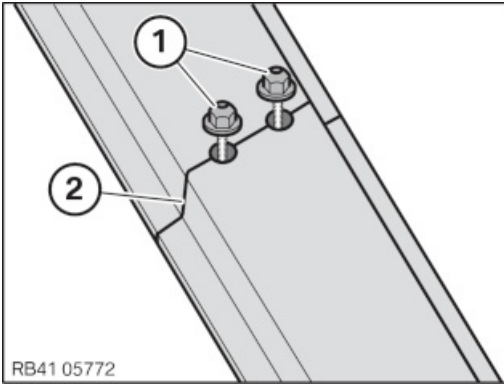
Grind off stud bolts and surplus adhesive flush.

Paint area as specified in BMW Painting Handbook.



Installing welded reinforcement plate





Attention!

Risk of damage!

Protect the adjacent components from heat and flying sparks.

Align new part to adjoining component and secure with gripping pliers.

First tighten the plastic nuts at the radii.

Only then tighten all the plastic nuts in the flat areas.

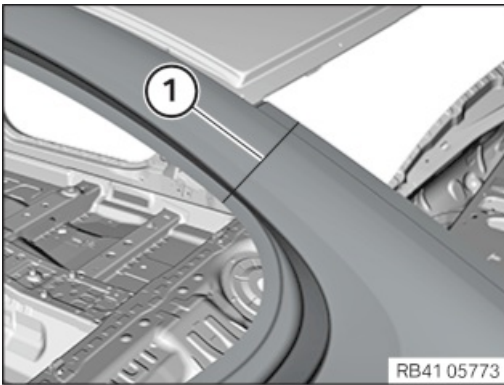
Tightening torque 41 14 1AZ.

Weld joint (2) between plastic nuts (1).

Release plastic nuts (1).

Grind down stud bolt until flush.

Weld joint (2) in the remaining areas.



Grind weld seam (1) until flush.

If necessary, straighten area (1) and level it with a multi-functional spatula.

Paint area as specified in BMW Painting Handbook.





For stripping and rigging operations, refer to texts on KSD CD (job number 41 35 081).

Observe gap dimensions.



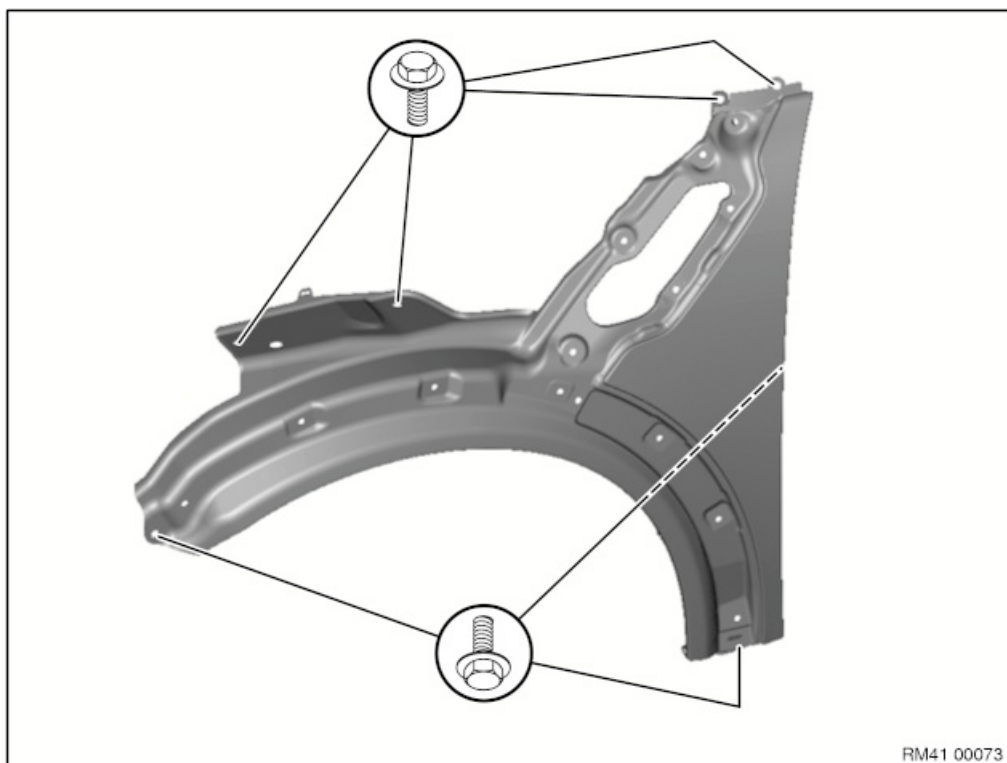
Attention:

Do not damage adjoining body components.



Necessary preliminary tasks:

- Remove cover from wheel arch at front left
- Remove trim panel for cover on side member at left
- Remove cowl panel cover



RM41 00073

Release screws.

Tightening torque 41 35 2AZ.



41 34 038

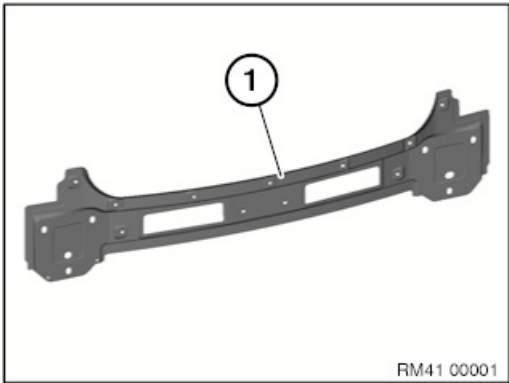
Replacing outer tail panel section



Read contents of Body, General.
Strip down vehicle



Procedure observe repair stage 2 !



Following new body parts are required (see Electronic Parts Catalogue):

- (1) Rear trim, outer skin

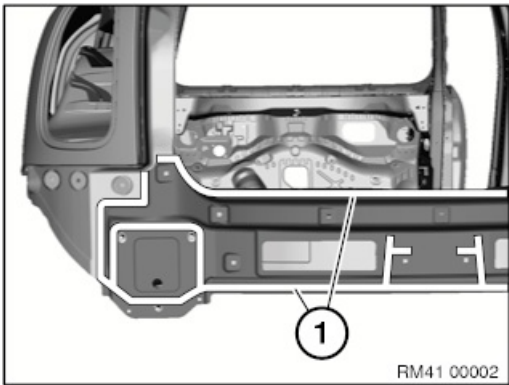
Following consumables are required:

Material	Quantity
Adhesive K5a	2
Blind rivets N3	12
Punch rivets N4	16
EMC screws	5
Cavity sealing wax remover	
Cleaning agent R1	1
Sealant D1	



Removing rear trim panel

Operation described predominantly on the left side. Right side identical.



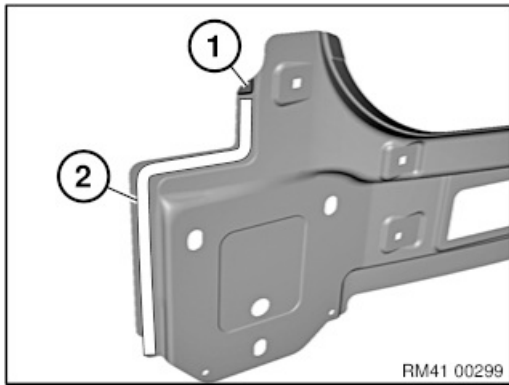
Open welded connections in areas (1).
Remove rear trim panel.



New part preparation

Operation described predominantly on the left side. Right side identical.

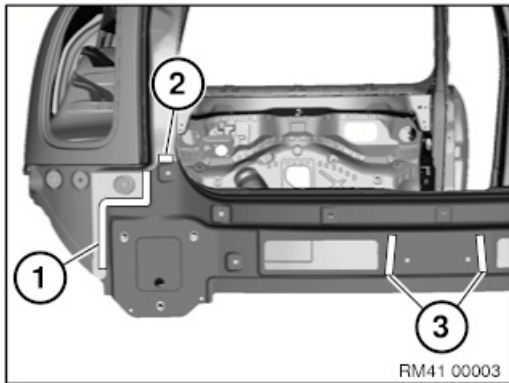




Disconnect section (1) according to schematic diagram.

Changed joining sequence: New part is fitted and installed in the area (2) from outside.

Set area (2) on the new part and on the vehicle.



Adjust rear trim panel to fit and secure.

Changed joining sequence: Work new part into position from outside at areas (1) and install.

In areas (1) to (3), create 4.2 mm dia. bore holes for blind rivets N3.

Area	Number
1	3 of
2	1 of
3	4

Remove new part again and deburr bore holes.

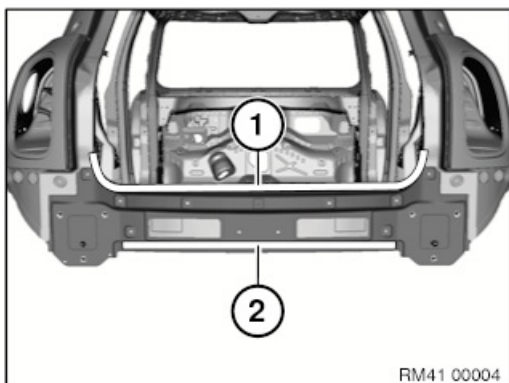


Important!

Do not grind new part and body in area of bonding surfaces.



Installing rear trim panel



Clean all bonding surfaces on new part and on vehicle with cleaning agent R1.

Apply adhesive to bonding surfaces.

When inserting rear trim panel, make sure there is sufficient adhesive on bonding surfaces.

Install rear trim panel and rivet with blind rivets N3.

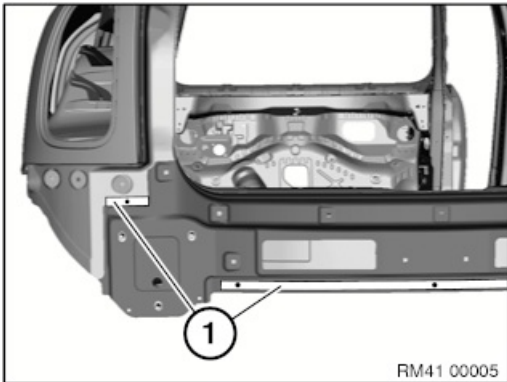
In areas (1) and (2) rivet rear trim panel with N4 punch rivets.

Area	Number
1	9
2	7





Mount support for bumper panel to secure rear trim panel. **Important!**
Prevent emerging adhesive from coming into contact with cross-member!



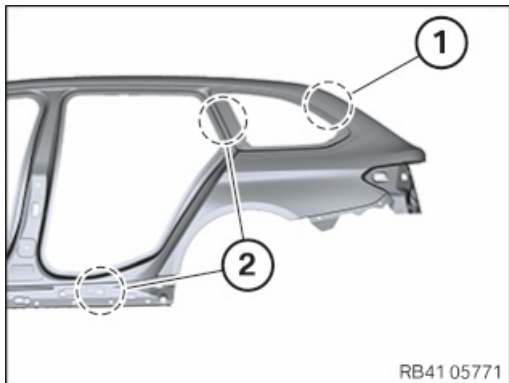
After hardening of the adhesive in areas (1), install a total of 5 EMC screws.



41 35 101 Replacing rear left side panel



Read contents of Body, General.
Procedure Observe repair stage 2!
Strip down vehicle.



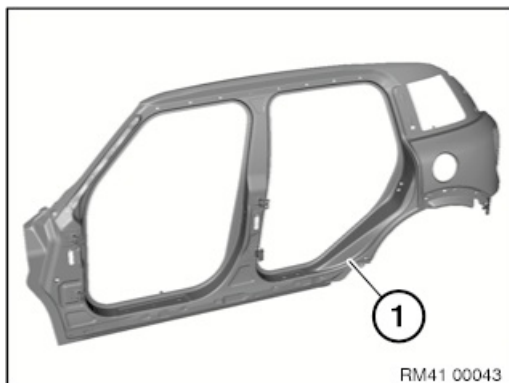
Example figure.

Due to the ever-increasing geometric complexity and the demanding post-processing steps on visible severance cuts, the joining technology of the reinforcement plate is switched from bonding to welding. This change applies to all BMW and MINI series.

Welding is done in area (1) (incl. water channel).

Bonding is done in areas (2).

Note changed procedure.



Following new body parts are required (see Electronic Parts Catalogue):

- (1) Side frame, outer, left
- Reinforcement plate, side sill
- Reinforcement plate, C-pillar
- Reinforcement plate, D-pillar
- Reinforcement plate, universal
- Mounting nuts

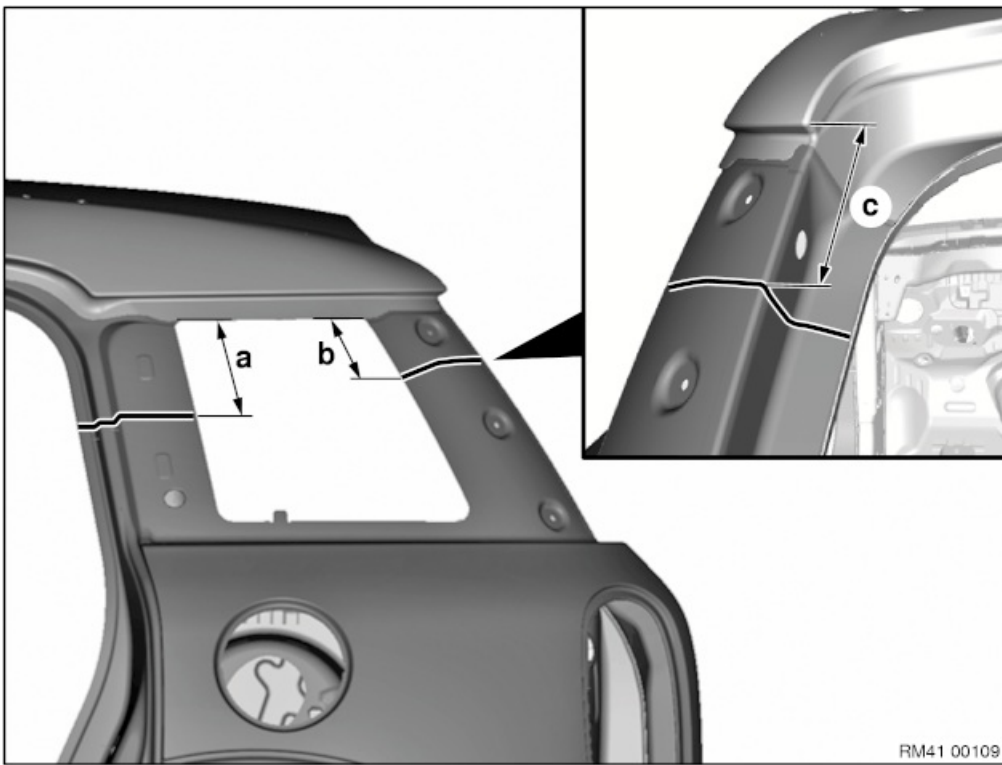
Following consumables are required:

Material	Quantity
Adhesive K5b	1
Adhesive K5a	1
Blind rivets N3	6
Punch rivets N4	35
Punch rivets N5	10
EMC screws	3
Cleaning agent R1	1
Cavity sealing wax remover	1
Sealant D1	1



Removing side panel





Mark severance cuts in accordance with specified dimensions and cut.

Attention!

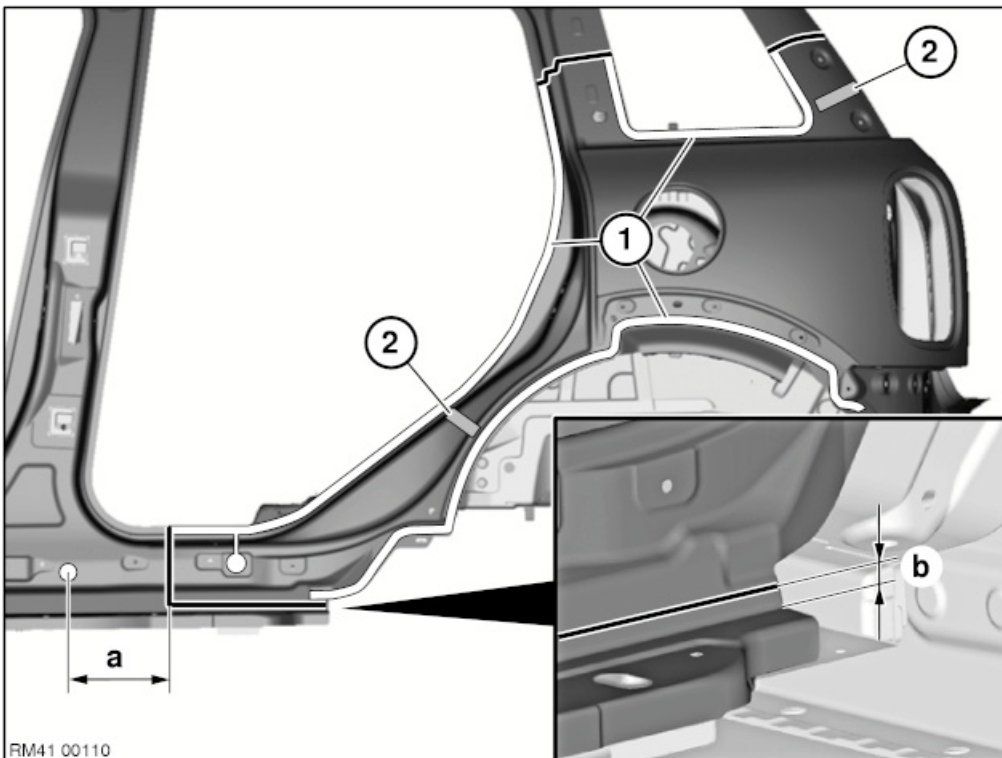
Cut outer panel only.

Compare position of severance cuts with reinforcement plates.

Dimension a = approx. 135 mm from component edge of roof skin.

Dimension b = approx. 115 mm from component edge of roof skin.

Dimension c = approx. 125 mm from corner of roof outer skin.



Mark severance cuts in accordance with specified dimensions and cut.

Attention!

Cut outer panel only.

Compare position of severance cuts with reinforcement plates.

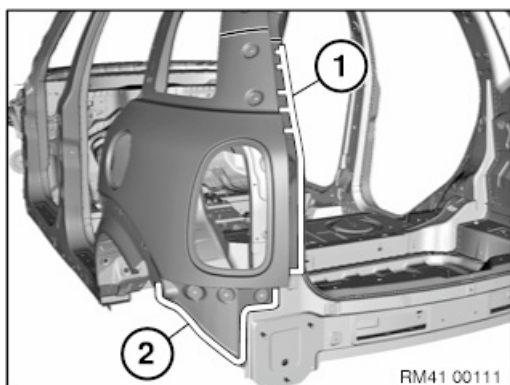
Dimension a = approx. 185 mm from centre point of 20 x 25 mm diameter hole.



Dimension b = approx. 20 mm from outer edge of sill.

Open welded connections in areas (1).

Release side wall from cavity acoustic baffles (2).



Open welded connections in areas (1) and (2).

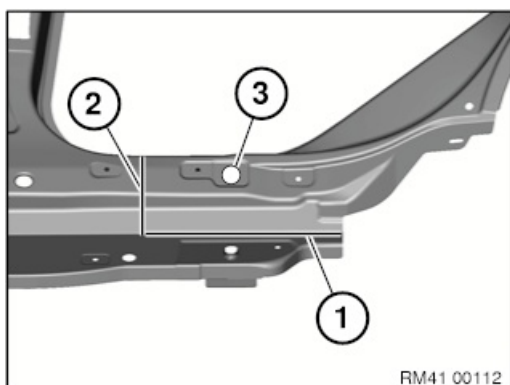
Attention!

Detach welding spots from side wall!

Take off side panel.



New part preparation

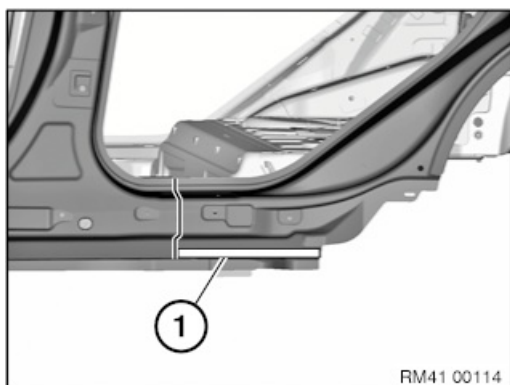


Cut new part on sill outer edge (1).

Mark severance cut (2) and the other severance cuts according to vehicle and cut.

Open weld joint in area (3).

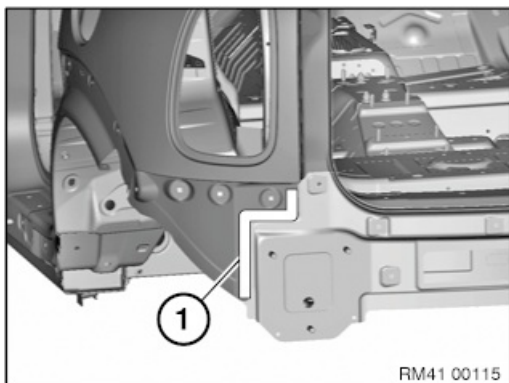
Prepare the reinforcement plates (bonded and welded) at the severance cuts.



Adjust new part to fit and secure.

Set 3 4.2 mm diameter bore holes for blind rivets in area (1).





Set 3 4.2 mm diameter bore holes for blind rivets in area (1).
Remove new part again and deburr bore holes.



Attention!

Do not grind/sand new part in area of bonding surfaces.



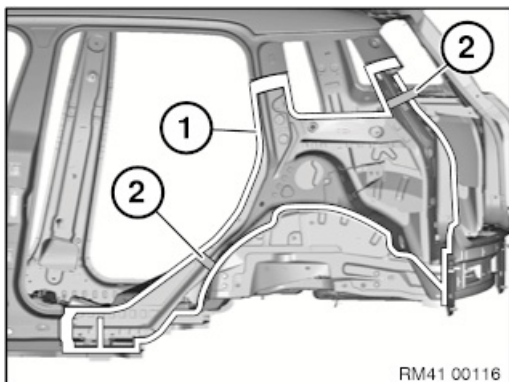
Installing side wall

Clean all bonding surfaces on vehicle, on the new part and on the reinforcement plates with cleaning agent R1.

Apply adhesive to reinforcement plates (side sill, C-pillar). Install reinforcement plates.

Note:

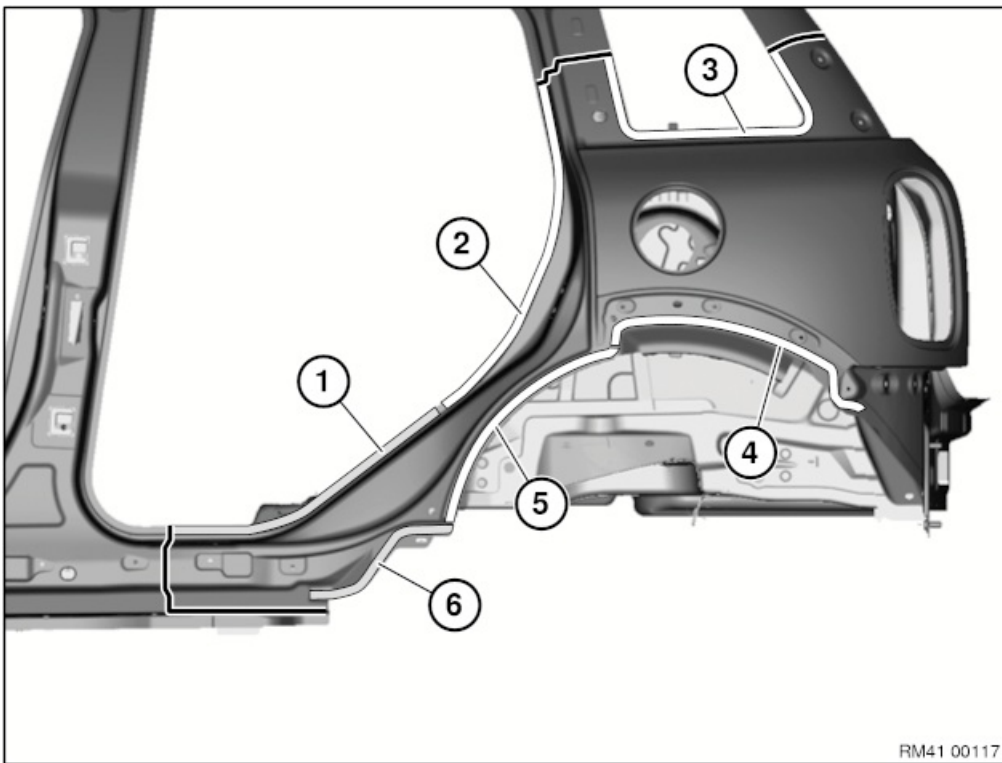
When installing reinforcement plates, make sure there is sufficient adhesive on bonding surfaces.



Apply adhesive in area (1).

Apply sealant to cavity acoustic baffles in areas (2).





Install side panel with a second person helping.

Note:

When installing side panel, make sure there is sufficient adhesive on bonding surfaces.

After adjusting side wall to fit, tighten nuts of reinforcement plates.

Secure side panel in area of reinforcement plates with gripping pliers.

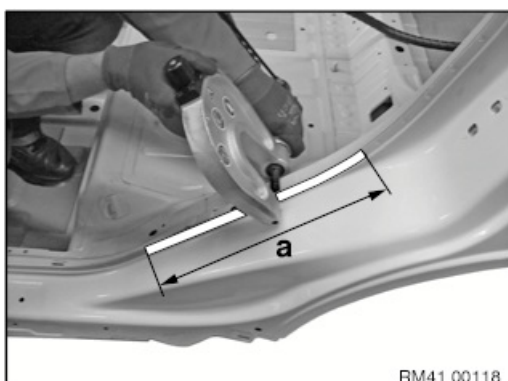
Rivet side panel with blind rivets N3.

Use **N5** punch rivets in areas (1) and (6).

Use **N4** punch rivets in areas (2) to (5).

Area	Number	Remarks
1	6	Punch rivet N5
2	8	Punch rivet N4
3	8	Punch rivet N4
4	6	Punch rivet N4
5	3	Punch rivet N4
6	4	Punch rivet N5

Weld the separation point at the D-pillar.



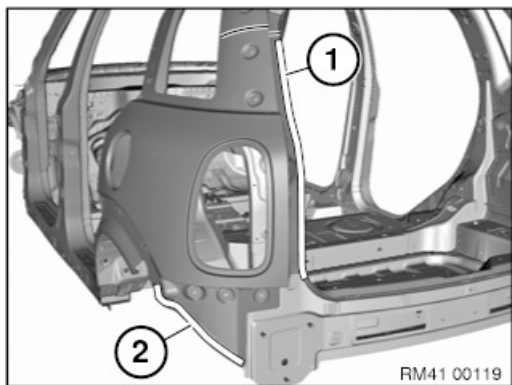
Attention!

Risk of damage!

In area a, the rivet tool may only be used in the interior of the vehicle.

Dimension a = approx. 350 mm.





Use 7 N4 punch rivets in area (1).

Use 3 N4 punch rivets in area (2).

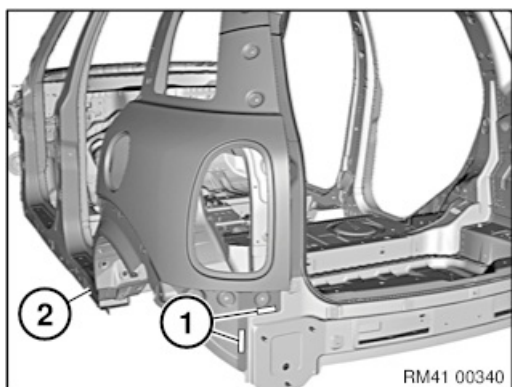
Attention!

In area (1), the punch rivets must be set from the side wall.



Remove excess adhesive. **Attention!**

Do not use any cleaning agents containing solvents.



After the adhesive hardens, install two EMC screw in areas (1).

Additionally, install one EMC screw in sill area (2).



*Note:*

Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

- Remove support for bumper trim (job number: 51 12 050)
- Remove holder for bumper on left (job number: 51 12 801)
- Remove guide for bumper at rear centre (job number: 51 12 825)
- Remove luggage compartment wheel arch panel (job number: 51 47151)
- Remove rear left side window (job number: 51 36 070)
- Remove rear light (job number: 63 21 170)
- Remove rear left wheel arch cover (job number: 51 71 041)
- Remove left wheel arch trim (job number: 51 13 105)
- Remove rear left lock striker (job number: 51 22 001)
- Remove left door sill cover strip (job number: 51 47 030)
- Remove panel for cover on left side member (job number: 51 71 447)
- Remove cover housing (job number: 41 63 003)
- Remove rear left door (job number: 41 52 080)
- Remove left gas pressure spring for tailgate (job number: 51 24 300)



41 5. ... Adjust door



Important:

Do not damage adjoining body components.

Minor corrections (realignment work) are permitted if the existing adjustment options are not sufficient.

More extensive additional work may result in damage to the door outer surface or cause wind noises.



Read contents of Body, General.

Observe gap dimensions.

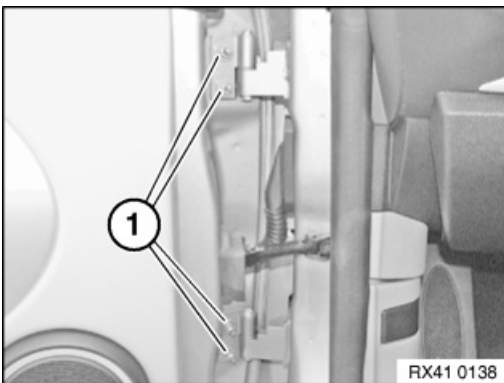
The door must be provided with all add-on parts for correct adjustment.

Adjust screwed body components from rear to front.

When the door is closed, the lock striker must not touch or scrape against the door lock. Look out for scratch marks.

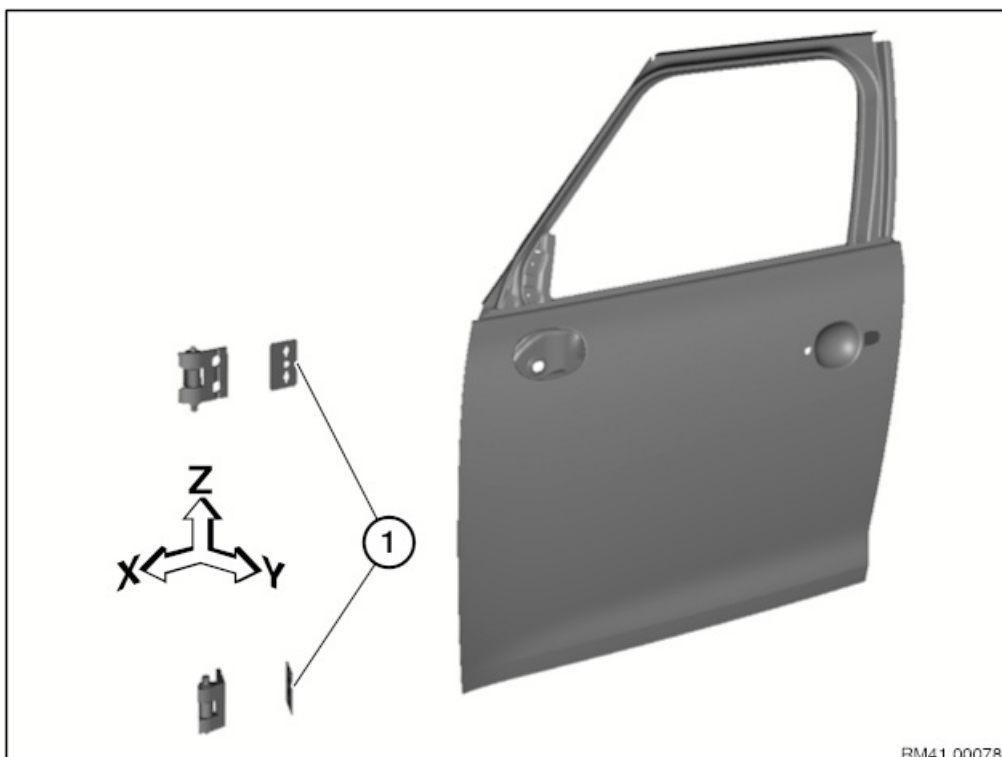
Slacken lock striker, remove if necessary.

R60: Repair work is described on the front door. Procedure on rear door identical.



Slacken nuts (1) until door can still just be moved.

Tightening torque 41 51 2AZ.



Top hinge:

Adjust door laterally (Y) by fitting shims (1).

Adjust door in longitudinal direction (X) and vertically (Z).

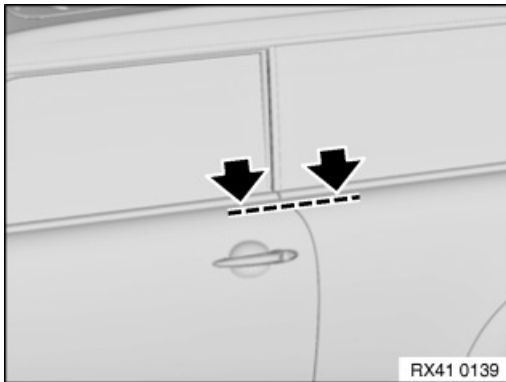
Bottom hinge:

Adjust door in longitudinal direction (X) by fitting shims (1).

Adjust door laterally (Y) and vertically (Z).

Installation note:

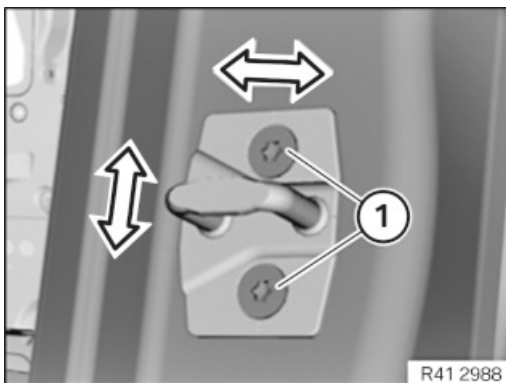
To preset the new part, carry over the number of shims (1) from the damaged door.



Check that adjoining body components are flush in terms of height and correct if necessary. **Note**

Height adjustment of door must not be influenced by lock striker.

If necessary, adjust lock striker.



Adjusting lock striker:

Slacken screws (1) until lock striker can still just be moved.

Move lock striker sideways in order to adjust transition between door and rear side panel.

Tightening torque 51 21 8AZ.

Tightening torque 51 22 7AZ.



After Installation note:

- Tighten all screws and nuts to specified torque.
- Touch up unpainted surfaces in the appropriate colour.



**Important!**

For production reasons the side impact beam is only screwed loosely.

Tighten screws of side impact beam.



Remount all components on the new door.

If necessary, replace damaged components.

The procedure is described in the repair instructions of the components.



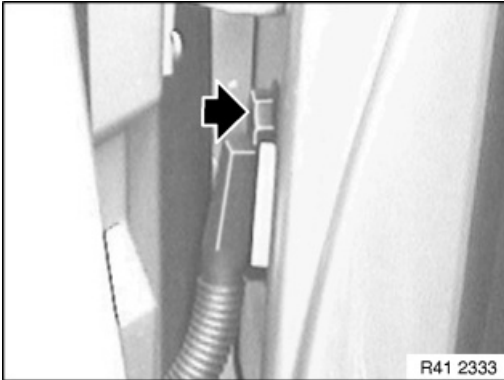
41 5. ... Removing and installing door



Important!

Do not damage adjoining body components.

Open door.



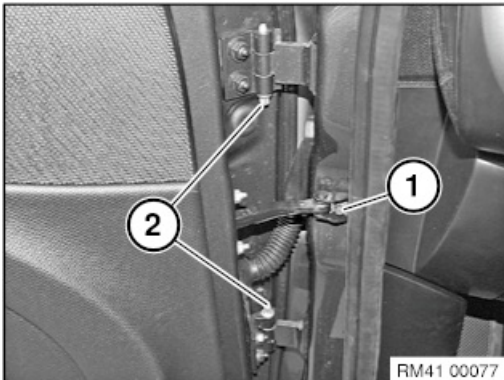
Release screw on connector frame.

Front door:

Tightening torque 41 51 3AZ.

Rear door:

Tightening torque 41 51 3AZ.



Note:

Secure door against closing.

Release screw (1) on door stop.

Front door:

Tightening torque 51 21 6AZ.

Rear door:

Tightening torque 51 22 4AZ.

Important!

Secure door against falling.

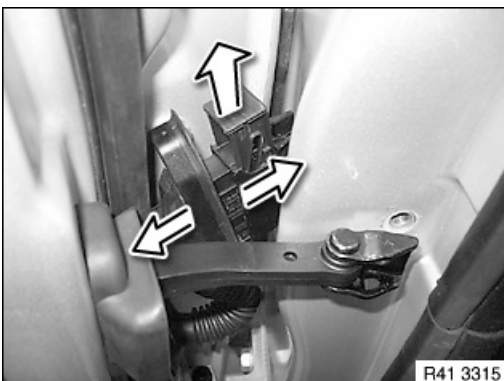
Release screws (2) and pull out of hinges.

Front door:

Tightening torque 41 51 1AZ.

Rear door:

Tightening torque 41 51 1AZ.



Pull plug connection from door post, unlock by pulling out bar and detach.

Unhinge door by moving upwards and place it on a suitable surface.

Installation:

If necessary, adjust door.



**Important!**

For production reasons the side impact beam is only screwed loosely.

Tighten screws of side impact beam.



Remount all components on the new door.

If necessary, replace damaged components.

The procedure is described in the repair instructions of the components.



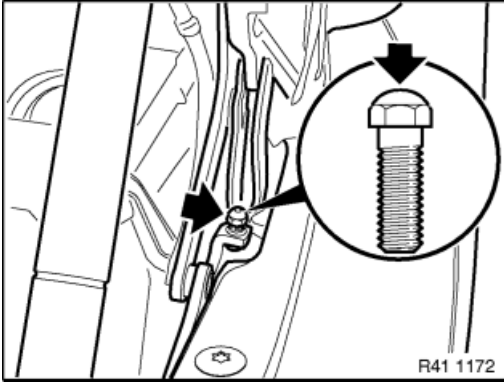


Read contents of Body, General.

Observe gap dimensions.

Make unpainted surfaces visible by also moving the hinges. Touch these up in the appropriate colour.

Do not damage adjoining body components.

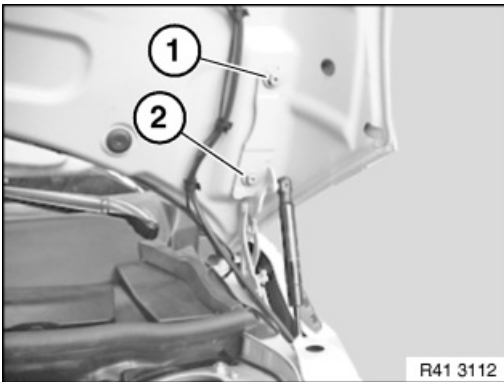


Note:

Check stop screw of engine compartment lid hinge on left and right.

Plastic head of stop screw must not be damaged or missing, replace engine compartment lid hinge if necessary.

The stop screw is preset and must not be used to adjust the engine compartment lid!



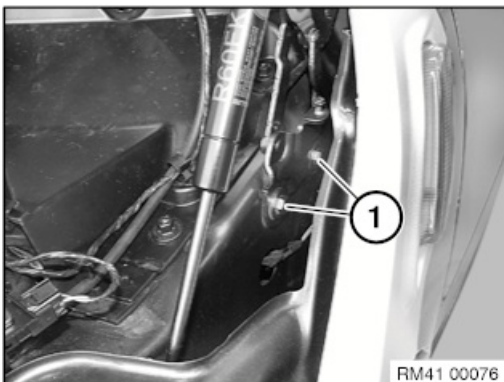
Loosen nuts (1) and (2) on left and right hinges.

Engine compartment lid must still just be able to be moved. Adjust engine compartment lid laterally and in longitudinal direction.

Tighten screws after adjusting engine compartment lid.

Tightening torque 41 61 1AZ.

If the adjustment range is not sufficient, release screws of engine compartment lid hinge on body and move hinge.

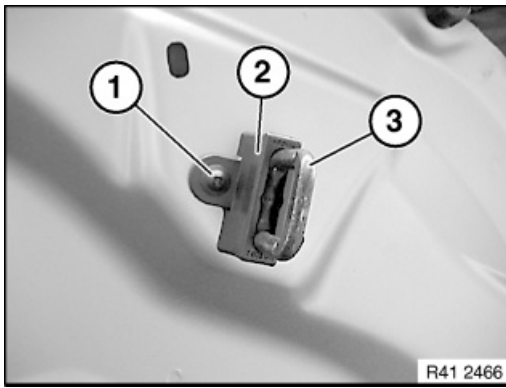


Height adjustment at hinge:

Slacken screws (1) and adjust hinge.

Tightening torque 41 61 2AZ.





Height adjustment at strikers:

Release screw (1) and remove cover (2).

Adjust engine compartment lid by rotating at striker to the front panel.

Height adjustment of engine hood/bonnet to side panel by means of stop buffers.

Note:

The engine compartment lid is correctly adjusted in the front section by a combination of pulling the strikers and pressing the stop pads.

Incorrect adjustment results in either wobbling of the engine engine compartment lid or sluggish unlocking.



Important!

Check function of retaining hook.



After Installation note:

- After adjusting the engine compartment lid, check gap dimension between headlights and engine compartment lid and adjust if necessary.
- Tighten all screws and nuts to specified torque.
- Touch up unpainted surfaces in the appropriate colour.
- If necessary, adjust front side panels.



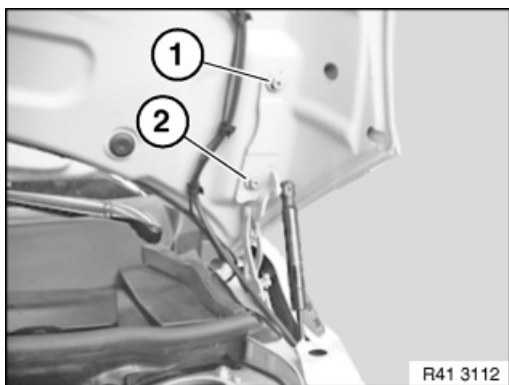


Read contents of Body, General.

For stripping and rigging operations, refer to texts on KSD CD (job number 41 61 000).

Necessary preliminary work:

- Disconnect all cable plug connections



Slacken nuts (1) and (2).

Tightening torque 41 61 1AZ.

Remove engine compartment lid with assistance of a second person.

Installation note:

Install engine compartment lid at screw locations to on hinge. This dispenses with the need for adjustment after installation.

If this is not possible, adjust engine compartment lid.

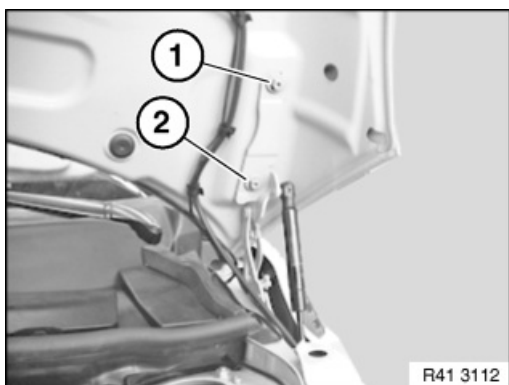




For stripping and rigging operations, refer to texts on KSD CD (job number 41 61 060).



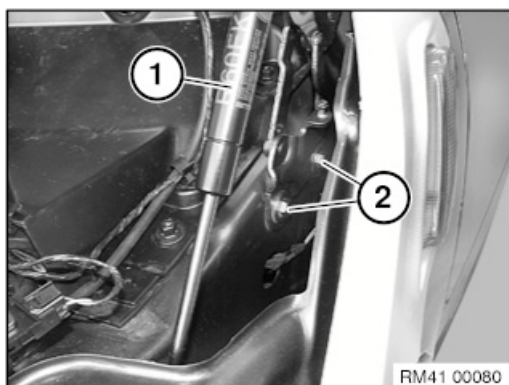
Carry out repair work with a 2nd person helping.



Secure engine compartment lid against falling down using a second person.

Release nuts (1) and (2).

Tightening torque 41 61 1AZ.



Release gas pressure spring (1) on engine compartment lid.

Release screws (2) and remove hinge.

Tightening torque 41 61 2Z.

Installation note:

Adjust hinge together with engine compartment lid.



41 62 014 Adjusting tailgate



Important:

Do not damage adjoining body components.

Minor corrections (realignment work) are permitted if the existing adjustment options are not sufficient.



Read contents of Body, General.

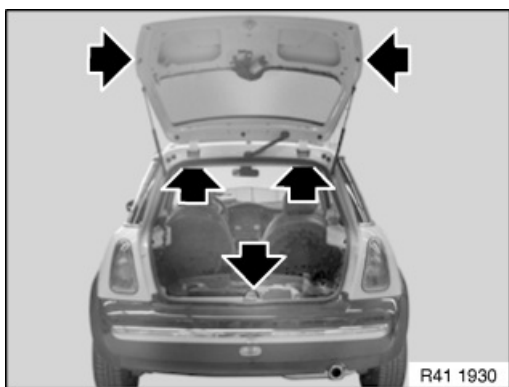
Observe gap dimensions.

The tailgate must be provided with all attachment parts for correct adjustment.

When the tailgate is closed, the lock striker must not touch or scrape against the tailgate lock. Look out for scratch marks.

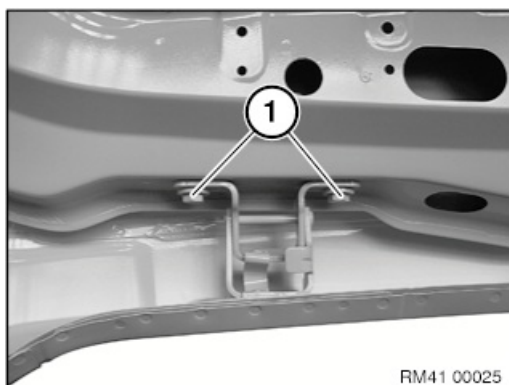
Slacken lock striker, remove if necessary.

Carry over schematic diagram to the relevant vehicle type.



R41 1930

Adjustment points for adjusting tailgate to fit.



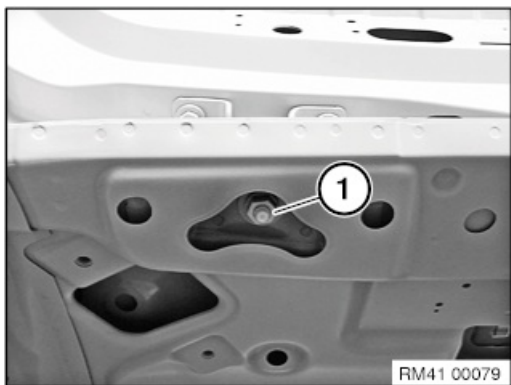
RM41 00025

Carry over the work step shown symmetrically to the other side of the vehicle.

Slacken screws (1)

Tightening torque 41 62 1AZ.





Carry over the work step shown symmetrically to the other side of the vehicle.

If adjustment range is not enough, also slacken nuts (1). Only accessible from passenger compartment.

Tightening torque 41 61 2AZ.

If necessary, adjust tailgate lock.

Adjust stop pads.



After Installation note:

- Tighten all screws and nuts to specified torque.
- Touch up unpainted surfaces in the appropriate colour.





Read contents of Body, General.

For stripping and rigging operations, refer to texts on KSD CD (job number 41 62 000).

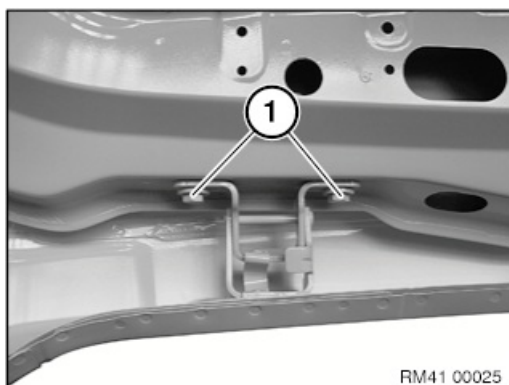
Necessary preliminary tasks:

- Remove tailgate trim.
- Remove left and right gas pressure springs.
- Disconnect all plug and socket cable connections on tailgate.



Warning!

Support tailgate in fully opened position with suitable apparatus.
Risk of injury.



Carry over the work step shown symmetrically to the other side of the vehicle.

Release screws (1).

Remove tailgate.

Installation note:

Tightening torque 41 62 1AZ.

Install tailgate at screw locations on hinge.

If necessary, adjust trunk lid.

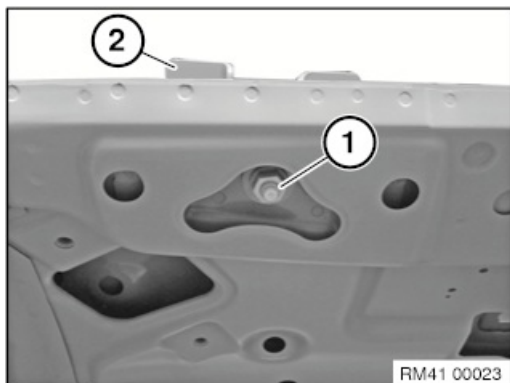


41 62 540 Removing and installing/replacing both hinges for tailgate (tailgate removed)



Read contents of Body, General.

For stripping and rigging operations, refer to texts on KSD CD (FR number 41 62 540).

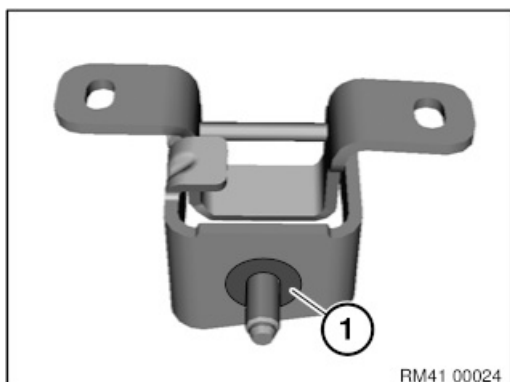


Operation is described on the left side. Right side identical.

Release nut (1) on vehicle.

Tightening torque 41 62 2AZ.

Remove hinge (2).



Installation note:

Before final assembly, apply sealing compound in area (1).

Adjust rear lid on the basis of the body gap dimensions.

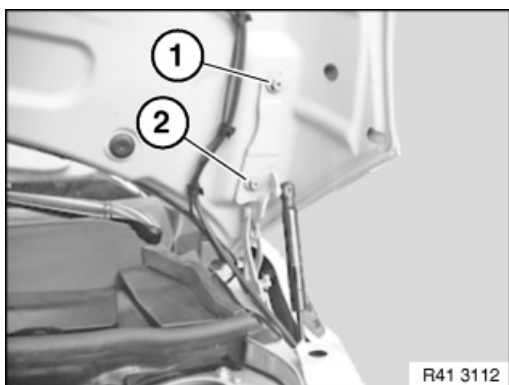




For stripping and rigging operations, refer to texts on KSD CD (job number 41 61 060).



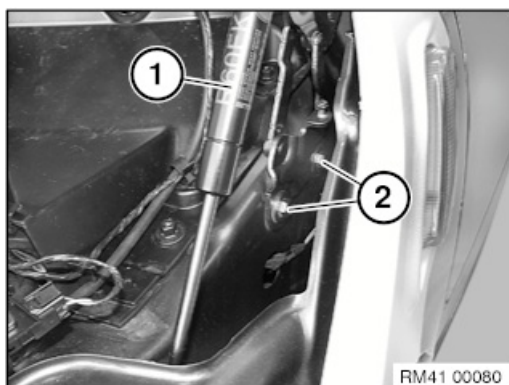
Carry out repair work with a 2nd person helping.



Secure engine compartment lid against falling down using a second person.

Release nuts (1) and (2).

Tightening torque 41 61 1AZ.



Release gas pressure spring (1) on engine compartment lid.

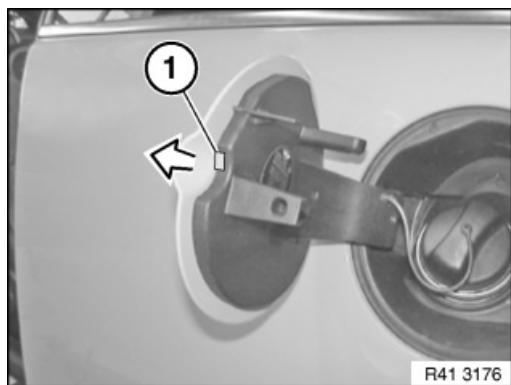
Release screws (2) and remove hinge.

Tightening torque 41 61 2Z.

Installation note:

Adjust hinge together with engine compartment lid.

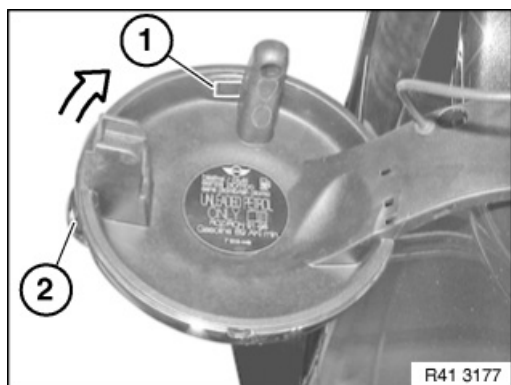


**MINI ONE and MINI COOPER models:**

Open flap for fuel filler neck.

Insert suitable screwdriver in recess (1) up to stop.

Pull of flap for fuel filler neck in direction of arrow.

**MINI COOPER S:**

Open flap for fuel filler neck.

Lever out lock (1) and turn flap for fuel filler neck (2) in direction of arrow and remove.





Necessary preliminary tasks:

- Remove servodrive for fuel filler flap
- Remove rear left wheel arch cover
- Remove flap for fuel filler neck

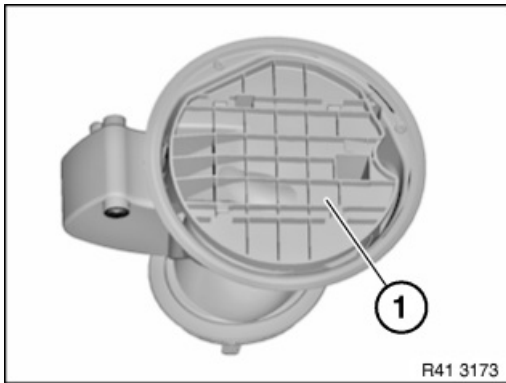
Note:

Carry over schematic diagram to the relevant vehicle type.



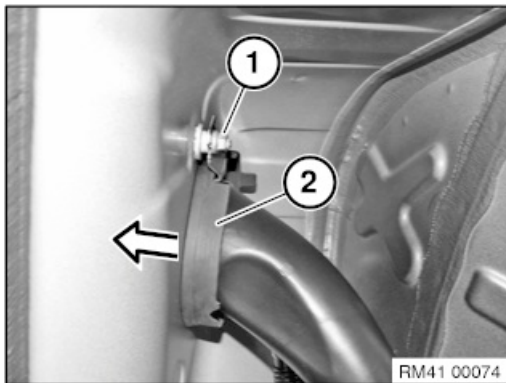
Important!

Deformation of the sheet metal flanges in the side panel and the wheel arch results in permanent vehicle leakage. Carry out removal/installation with great care.



The following body new parts are required (refer to Electronic Parts Catalogue)

- (1) Cover bowl



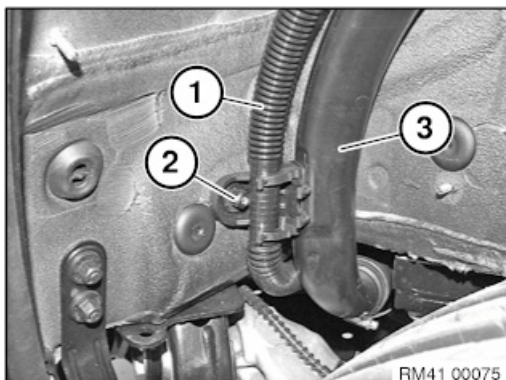
Slacken nut (1).

Tightening torque 16 11 1AZ.

Release rubber seal (2) from the sheet metal flange and press it outward in the direction of the arrow.

Installation note:

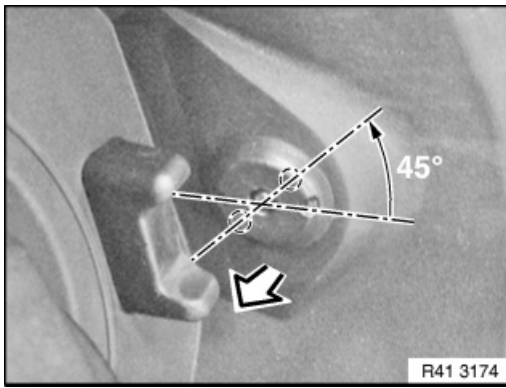
Ensure that the grounding cable is correctly screwed onto the body (1).



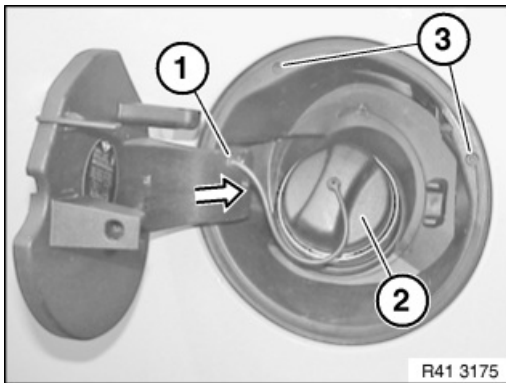
Unclip the ventilation (1).

Release nut (2) and fuel filler pipe (3) slightly.

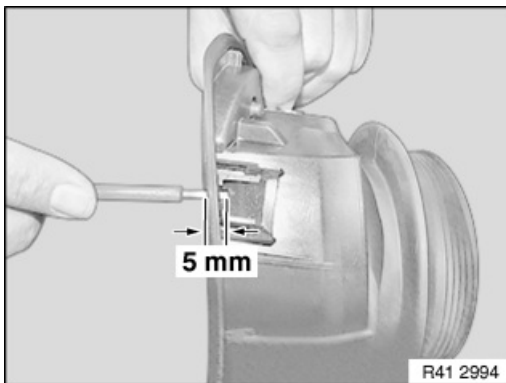




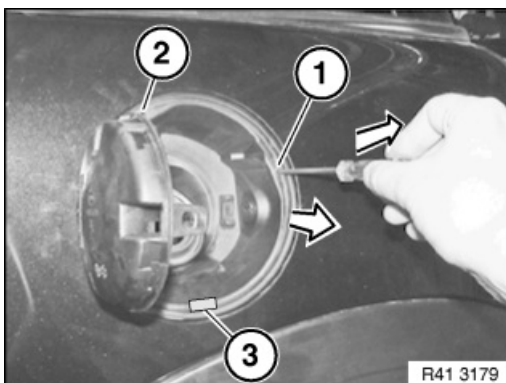
Turn sleeve through approx. 45° and pull out in direction of arrow.



Press retaining strap (1) inwards in direction of arrow and remove.
Remove cover (2).
Pierce cover bowl at markings (3) with a small screwdriver.



Insert screwdriver to a depth of max. 5 mm and unlock cover bowl latch mechanism.

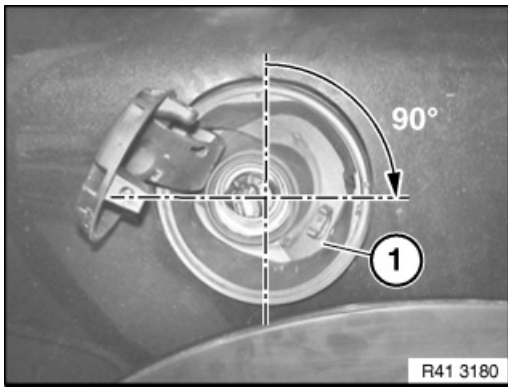


Unlock latch mechanisms (1) and (2) in succession.
Lever out cover bowl in area (3) with plastic wedge.

Important!

Do not damage sheet metal flange of side wall.

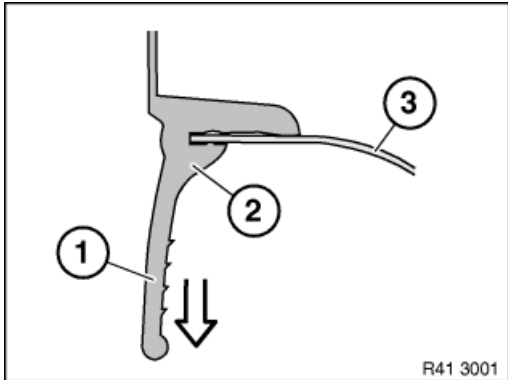




Carefully turn cover bowl (1) in direction of arrow and remove. *Installation note:*

Open hinge arm.

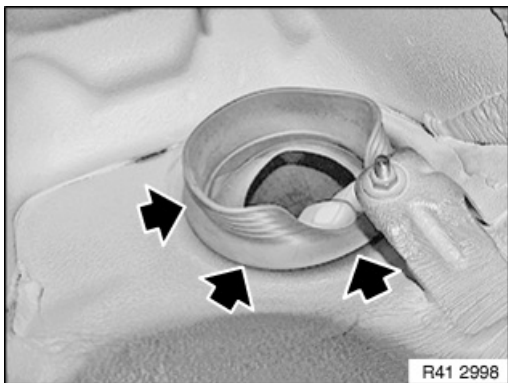
Insert cover bowl and engage sealing sleeve over fuel filler pipe.



Installation note:

Sealing lip (2) has a shaped extension that serves as a fitting aid (1).

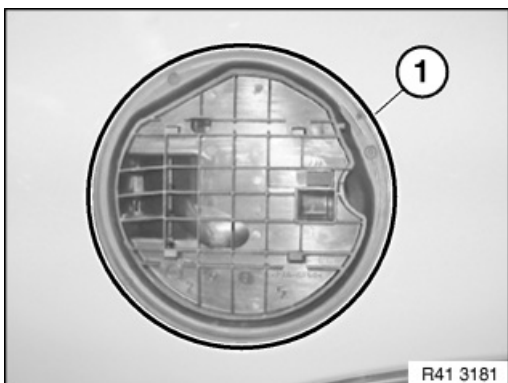
Using fitting aid (1), pull sealing lip (2) over sheet metal flange of wheel arch (3).



Installation note:

Illustrations shows fuel filler pipe removed.

Check that sealing lip is correctly seated.



Installation note:

Cover bowl must snap into place 3 times.

After installing, carefully check that cover bowl is securely seated.

There must be no discernible gap between sealing lip and side wall in area (1).



41 ... 0 Notes on the repair technique used in the main group 41

Two different repair techniques are used in body repair.

These are welding and bonding/riveting.

If the repair instructions do not specify a repair technique, then welding must **always** be used.

The bonding/riveting repair technique is **always** described in detail in the repair instructions.

Quality standards must be met.



64 00 ... Information on using cleaning agent/paints (personal protection equipment)



Warning!

Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!

Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!



Important!

Observe following instructions:

- Store cleaning agents/paints only in a secure cabinet.
- Keep cleaning agents/paints away from naked flames and other sources of ignition.
- Protect cleaning agents/paints from high temperatures and direct sunlight.
- Always keep an eye douche on hand, change the water regularly (once a month).



Important!

Observe following instructions before use:

- Manufacturer's instructions (on container/packaging)
- Hazard warnings (on container/packaging)
- Manufacturer's instructions on package insert
- Material safety data sheet of manufacturer
- Product information in EPC
- National market regulations



Important!

Observe following instructions during use:

- Do not eat, drink or smoke while working with these products.
- Avoid direct contact with skin and eyes.
- Wear personal protective clothing/equipment.
- Ensure that all enclosed areas are well ventilated or extract fumes directly.
- Immediately change working clothes soiled with cleaning agent/paint.
- After finishing work, wash your hands and apply protective skin cream.



Important!

Follow hazard warnings and wear personal protection equipment!





First Aid:

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapours ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.



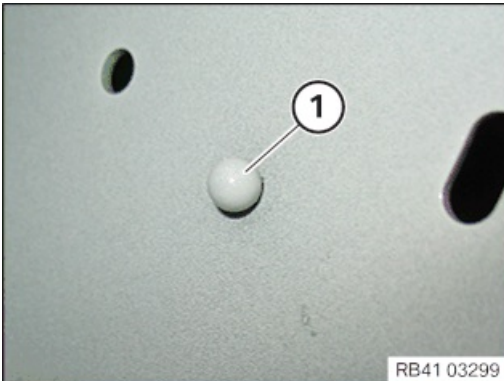
Recycling:

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.



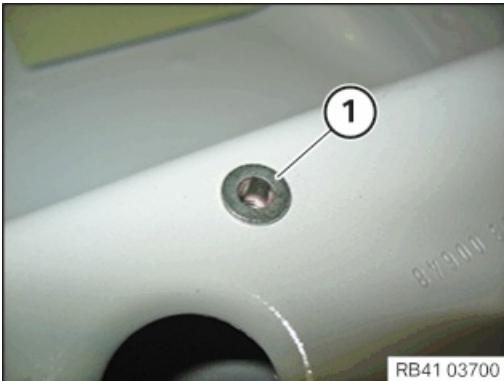
Note: On BMW and MINI bodies, various welded and pushed in bolts are being used.



Single ball/double ball (version 1):

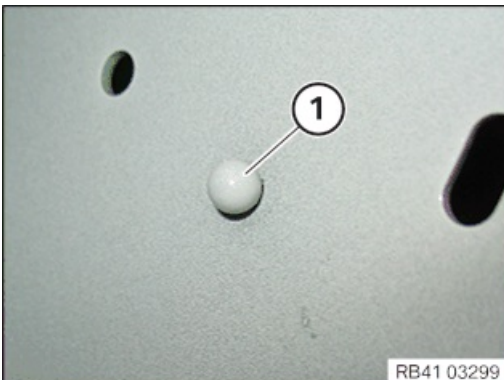
Grind off any residues of the single ball (1), if applicable.

Drill hole with diameter 7 mm.



Set blind rivet nut (1).

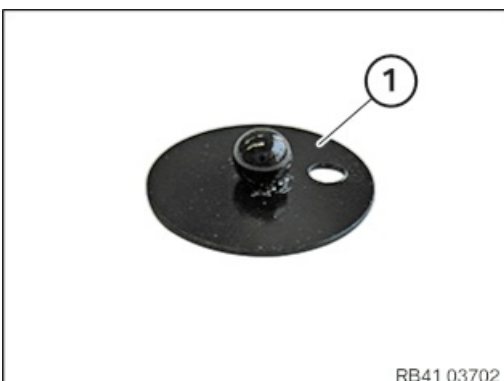
Screw in single ball with thread until a height of 5 mm (double ball 10 mm) is reached.



Single ball/double ball (version 2):

Grind off any residues of the single ball (1), if applicable.

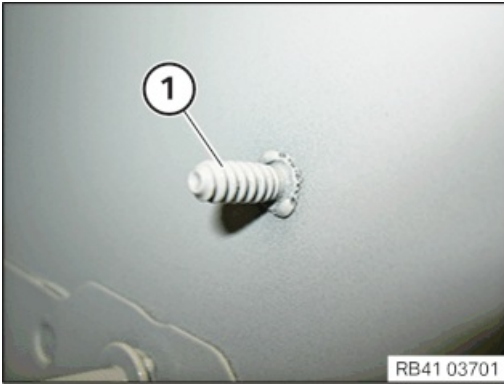
Clean area with solvent cleaner R1.



Clean bonding surface of repair element single ball (1) with solvent cleaner R1.

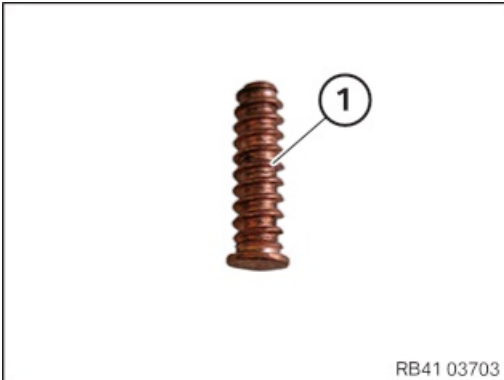
Bond repair element optionally with adhesive K1, K5 or window pane adhesive at the same position.



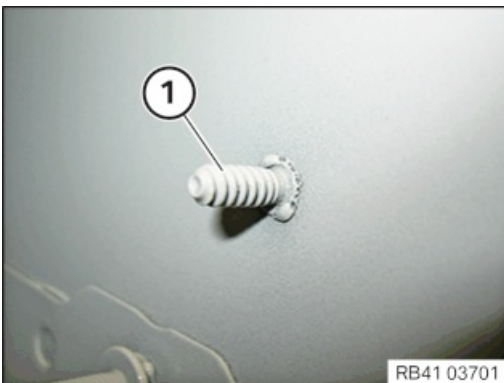


Coarse threaded bolt (version 1):

Grind off any residues of the coarse threaded bolt (1), if applicable.



Spot weld coarse threaded bolt to same position.



Coarse threaded bolt (version 2):

Grind off any residues of the coarse threaded bolt (1), if applicable.

Drill hole with diameter 7 mm.

Set blind rivet coarse threaded bolt using riveting pliers.



51 00 ... Notes on component bonding with adhesive tape

Unless specified otherwise in vehicle-specific or component-specific instructions, the following notes apply.

Follow repair notes for bonded gaskets for rubber seals.

1. General notes

- Bonding at room and object temperature of $>+18\text{ }^{\circ}\text{C}$.
- Newly painted parts may only be bonded after a drying time of at least 24 hours.
- Optimal bonding/attachment to the background surface is achieved after approx. 48 hours. Components must not be exposed to mechanical strain beforehand (car wash, strength test, etc.).
- Do not touch bonding area.
- It is not the length of time that pressure is applied but rather the force of pressure applied that is crucial.
- Detaching the adhesive tape after pressing destroys the adhesive layer.

2. Auxiliary materials and tools

- Cleaning agent R1 or cleaning agent R2
- Sika Activator 205
- Fluff-free cleaning cloths
- Pressure roller

3. Preparations

- Remove all adhesive residue or clean new part thoroughly
- Clean the areas to be bonded immediately before bonding to remove silicone and grease residues.
- Treat adhesive strips on glass or painted surfaces with Sika activator 205.

Note:

Sika activator 205 **apply extremely thinly. It must not be coated beyond the bonding surface.**

Note: air drying time: ≥ 1 minute

4. Bonding

4.1 Components without preassembled adhesive tape

- Pull off liner* from adhesive tape
- Position adhesive tape on component and stick on
- Press down adhesive tape over entire adhesive area
- Continue with Point 4.2

* Liner is the protective film on the adhesive tape.

4.2 Components with pre-fitted adhesive tape

- Pull off liner* from adhesive side (if adhesive area is large, do not pull off liner completely)
- Align component in correct position on vehicle
- Press down component over entire adhesive area
Minimum contact pressure $\geq 15\text{ N/cm}^2$ (firm thumb pressure reaches approx. 35 N/cm^2)

* Liner is the protective film on the adhesive tape.



51 00 ... Notes on installing rubber window seals

1. Work safety when handling lubricant G14*

- Wear safety goggles, protective gloves and if necessary an apron.
- Do not eat, drink or smoke in the area of processing/application
- Ensure rooms are well ventilated.
- Keep away from heat and ignition sources
- In event of skin contact: Wash areas of skin affected with soap and water immediately, change work clothing which has been fouled with lubricant immediately (keep spare work clothing in reserve)
- In event of eye contact: Rinse eyes immediately with plenty of water and seek medical advice
- Observe safety data sheet (see Aftersales Assistance Portal (ASAP) - Service/Technology - Safety Data Sheet - 7-digit part number)

2. General notes

- Use only the BMW-approved lubricant for fitting
- Application only at room and object temperatures between 18 and 25 °C
- Lubricant dries at different rates depending on the quantity, temperature and ventilation and becomes sticky
- Lubricant can only be used for fitting and not for fault elimination (e.g. grating)
- Newly painted parts may only be brought into contact with the lubricant after cooling
- Optimal bonding to the surface is achieved after approx. 48 h. The rubber window seal must not be exposed to mechanical strain beforehand. (car wash, strength test, etc.).

Important!

To avoid groaning noises, do not use soapy water (low-surface-tension water with washing-up liquid) or lubricant containing silicone.

3. Auxiliary materials and tools

- Spirit, cleaning cloth, plastic squeegee, needle
- Lubricant G14*
(* sourcing reference BMW Group Parts Department)

4. Preparations

- Heat and remove anti-friction agent residues with a hot air blower or clean new part thoroughly
- Immediately prior to fitting, clean the work area with spirit in order to remove silicone and grease residues

Note:

Air drying time approx. 1 min:

5. Assembly

- Apply a thin coating of lubricant to the rear side of the rubber window seal only
- Perform fitting within 30 min of applying lubricant
- Lubricant dries after fitting and becomes sticky

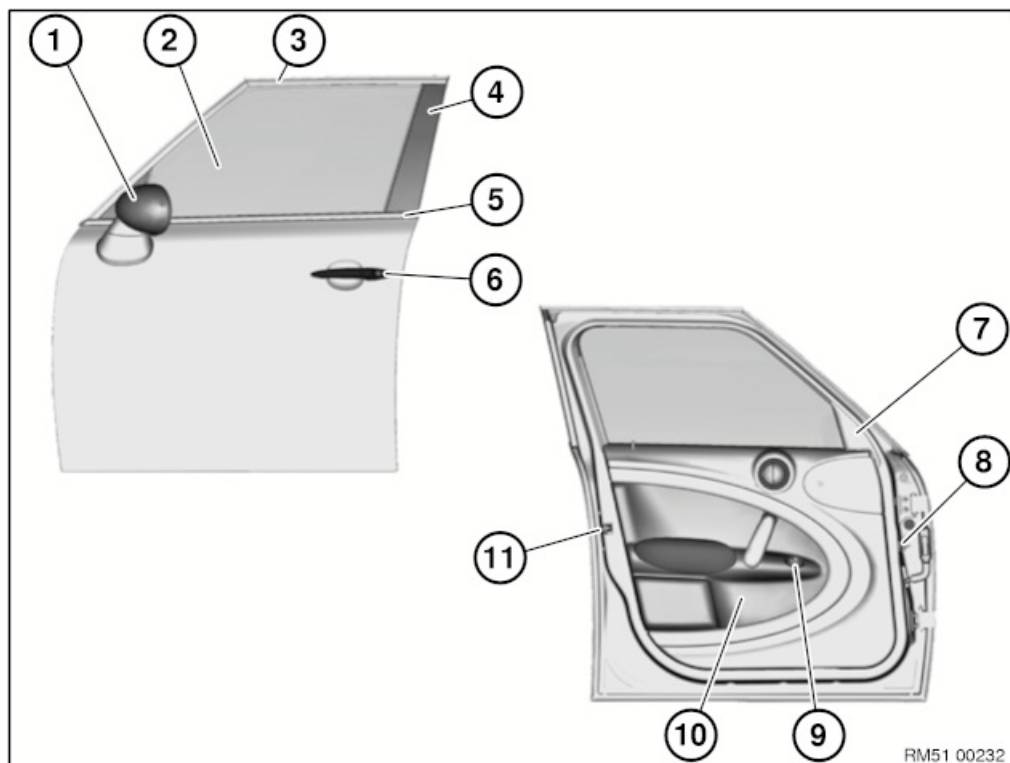


51 00 ... Overview of consumables (Electronic Parts Catalogue)

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Cleaning agent R2	Cleaning agent R2	83 19 0 417 324	500 ml
Lubricants G14	Lubricants G14	83 23 2 360 412	900 ml / Notes
Sika Activator 205	Aktivator 205	83 19 0 030 155	250 ml
Yellow plastic adhesive tape	Adhesive tape	83 19 9 410 979	A = 66 mm; B = 50 mm
Double-sided adhesive tape	Adhesive tape	54 11 2 290 978	L = 50 mm/W = 12 mm
Masking tape	Masking tape	81 22 9 400 181	L = 50 mm / W = 19 mm
Masking tape	Masking tape	81 22 9 400 388	L = 50 mm / W = 30 mm
Eraser disk	Scotch Brite eraser disk	51 91 0 402 946	with shaft
Cutting cord	Cutting cord	81 43 2 344 272	Notes
Adhesive set K6	Adhesive set K6	83 19 2 317 925	
Window glass adhesive	Window glass adhesive, cold, 1 hour	83 19 2 289 286	
Profile rubber adhesive		83 19 2 232 322	
Set of felt pads	Set of felt pads	51 45 2 353 024	



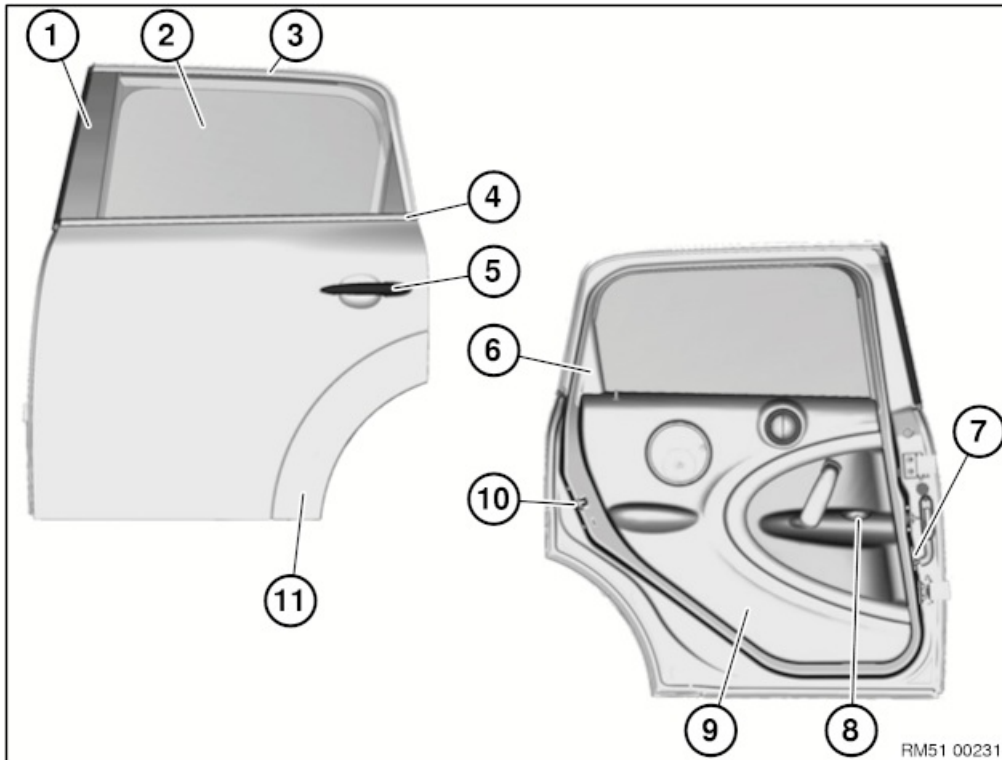
51 00 .. Overview of front door



- | | |
|--------------------------------------|--|
| 1 Exterior mirror | 7 Cover on window frame (see rubber window seal for door window) |
| 2 Door window glass | 8 Door brake |
| 3 Rubber guide for door window glass | 9 Switch for exterior mirror/power window regulator |
| 4 Trim on window frame | 10 Door trim panel |
| 5 Window cavity cover strip | 11 Door lock |
| 6 Outer door handle | |



51 00 .. Overview of rear door



- | | |
|--|--------------------------------------|
| 1 Trim on window frame | 7 Door brake |
| 2 Door window glass | 8 Rocker switch for window operation |
| 3 Rubber guide for door window glass | 9 Door trim panel |
| 4 Window cavity cover strip | 10 Door lock |
| 5 Outside handle | 11 Wheel arch cover |
| 6 Window frame cover (refer to rubber window seal for door window) | |



41 00 ... Replacing blind rivets



Special tools required:

- 2 348 128
- 72 1 210



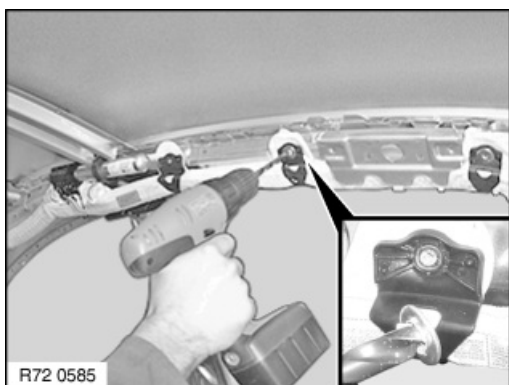
R72 0582

Important!

Lay out protective mats to protect the interior equipment against swarf from the drilled-out rivets and damage.

Lay out protective mats in the relevant working area:

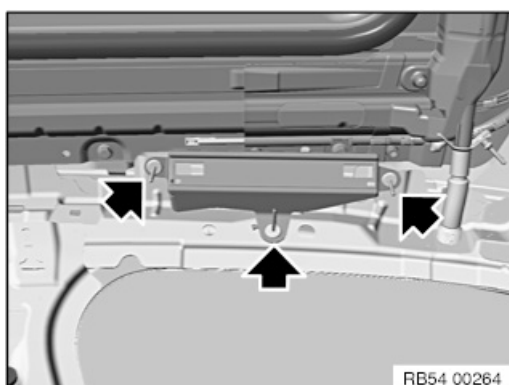
- Instrument panel
- Entrance area
- Passenger compartment



R72 0585

Schematic diagram of folding pack holder for head airbag:

Drill off rivet plate down to rivet shank with a 10 mm twist drill bit.

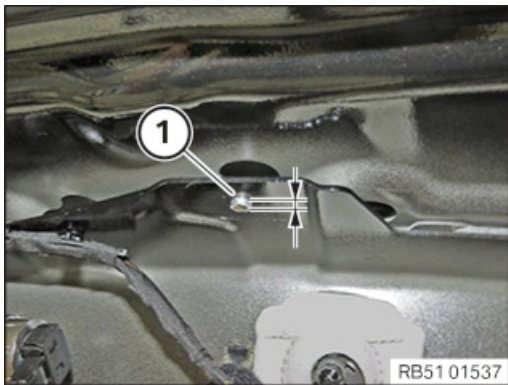


RB54 00264

Described for grab handle holder:

Drill off rivet plate down to rivet shank with a 10 mm twist drill bit.





Drill out all blind rivet protrusions (1) up to the body.



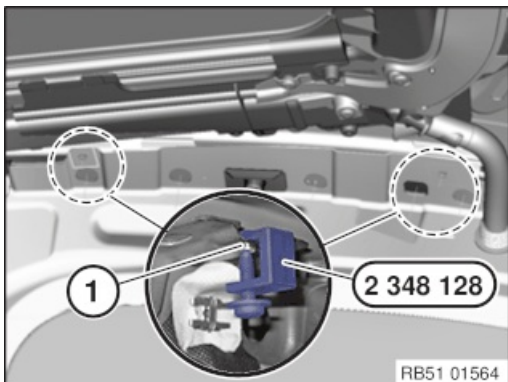
Installation note:

Apply primer to paintwork damages on side frame.

Note:

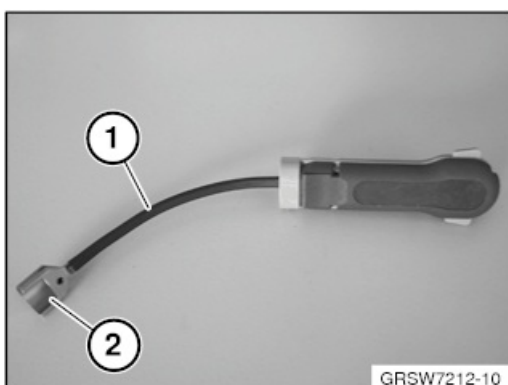
Depending on accessibility, the rivet heads will have to be removed using special tool 2 348 128 or 72 1 210.

In areas that cannot be reached using special tools, cavity foam HS3 must first be applied around the rivet head before the rivet head is then punched out immediately..



Removal of rivet head with special tool 2 348 128:

Press off rivet heads (1) using special tool 2 348 128 and remove.



Removal of rivet head with special tool 72 1 210:

Shank (1) of special tool 72 1 210 is flexible and can be adapted to the relevant body contours.

Note:

Insert butyl in the collecting tray (2) to secure rivet heads and prevent them from falling out.





Insert special tool 72 1 210 through bore hole in body next to attachment points.

Position special tool from rear on rivet head in cavity.

Note:

A second person will be needed to help hold the special tool on the rivet head during the driving-out operation.

Make sure collecting tray is correctly fitted on rivet head.

Drive out stem with hammer and 6 mm punch.

Carefully feed special tool out of body so that rivet head does not fall out of collecting tray.



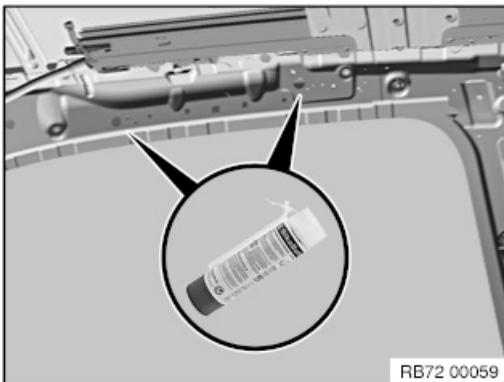
Note:

If the rivet falls out of the collecting tray into the side frame when the special tool is fed out, this area must be generously filled with foam.

For details of procedure for filling cavities with foam, see further operations.

Use cavity preservation (refer to BMW Group Parts) for foam filling.

Cavity foam (refer to BMW Group Parts) may also be used if required.



Fit tube to foam can.

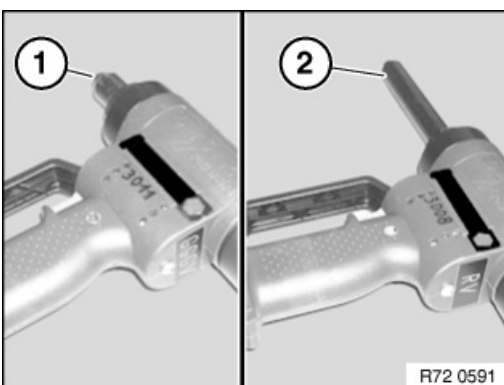
Push the hose in through the pillar holes.

Fill cavity with a filling material.

Warning!

Empty foam can completely onto cardboard and after hardening dispose of foam and can in residual waste.

Can may burst if not completely emptied.



Overview of rivet gun:

Riveting of gas generator housing and holders for folding pack with rivet gun (refer to BMW Workshop Catalogue).

The interchangeable head is changed for the different work operations.

Riveting of gas generator housing with:

- 1.) 17/36 nosepiece and short shank

Riveting of holders for folding pack:

- 2.) 17/40 nosepiece and long shank



**Warning!**

If work is carried out in area of airbag systems, e.g. on:

- Door trim panels
- Interior trims
- Dashboard etc.

the ignition must be turned off in each case.

- The ignition must always be off.
- The ignition key must be removed from the ignition lock.

This eliminates the danger of injury.



00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



Warning!

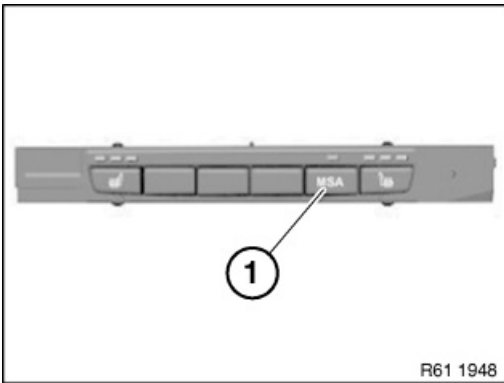
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

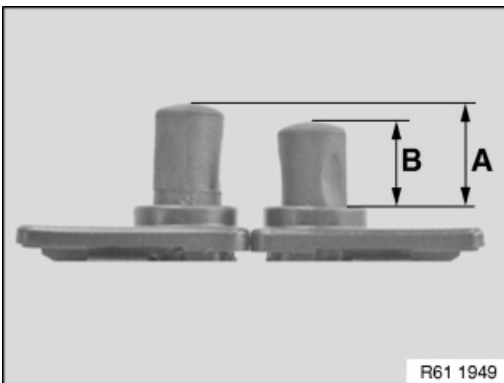
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode
A = 10 mm
 - Basic setting (engine hood/bonnet open)
B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



When working with diagnosis tools:

- Observe instructions in diagnosis tool





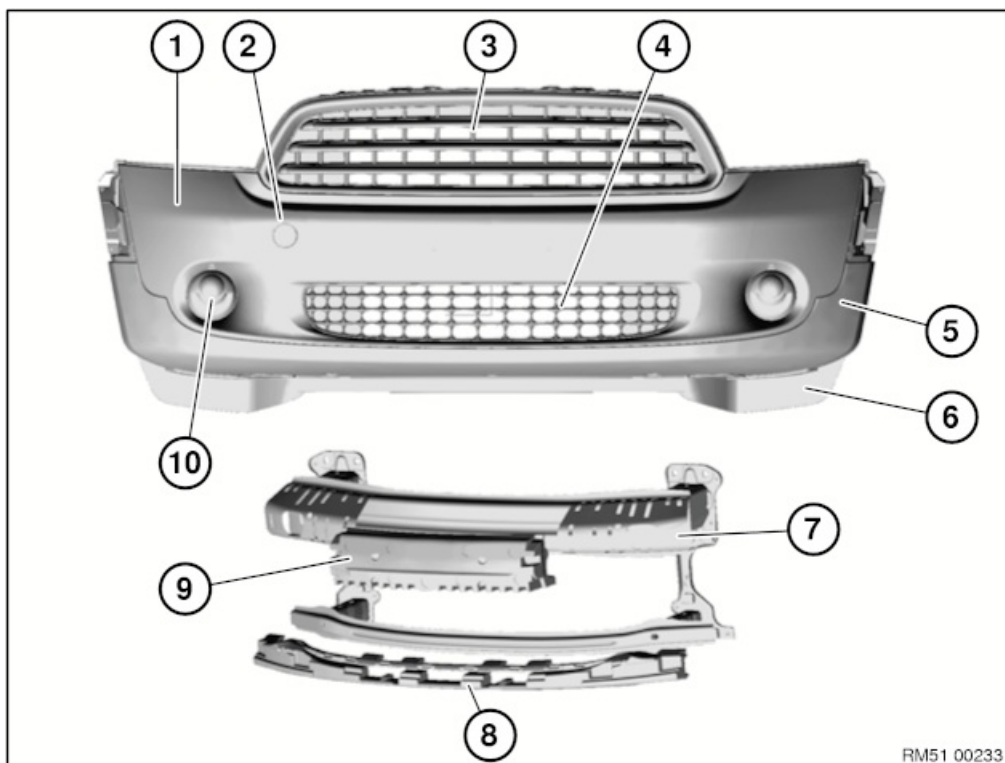
Note:

For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) Service Information (bulletin) 61 01 07 335
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) Service Information (bulletin) 61 01 10 629



51 11 ... Overview of front bumper

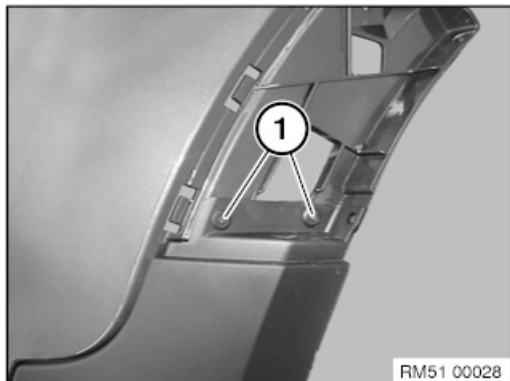


- | | |
|--|--|
| 1 Bumper panel | 6 Air guide |
| 2 Cover on towing eye | 7 Support for bumper panel |
| 3 Front radiator grille | 8 Impact absorber for support of bumper panel (bottom) |
| 4 Ornamental grille (bottom) in the bumper panel | 9 Impact absorber for support of bumper panel |
| 5 Spoiler (centre) | 10 Position lights / fog lights |

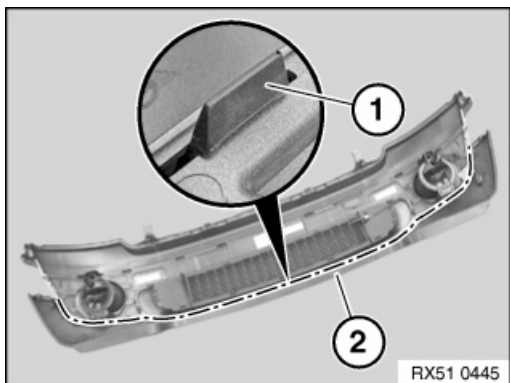


**Necessary preliminary tasks:**

- Remove front bumper panel



Release left and right expanding rivets (1). *Installation note:*
Replace expanding rivets.



Release catches (1) and remove spoiler (2). *Installation note:*
Latch mechanisms (1) must not be damaged.

**Replacement:**

- Modify air guide(s)

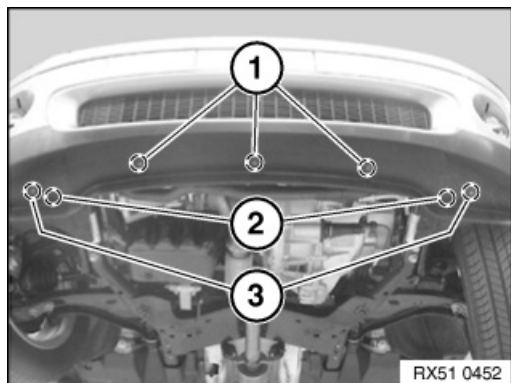


**Necessary preliminary tasks:**

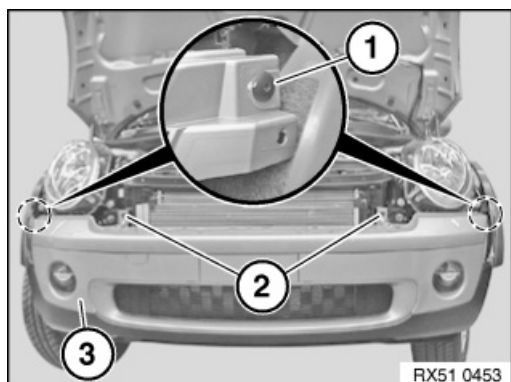
- Remove front grille
- Remove cover on wheel arch from bumper panel

On vehicles from version 08/2010 (not R60/61):

- Remove centre cover



Release the expanding rivets (1 and 2) according to the version.
Release screws (3).

**On vehicles with version up to 08/2010 (and R60/R61):**

Release screws (1 and 2).

Pull bumper panel (3) slightly towards the front with aid of a 2nd person.

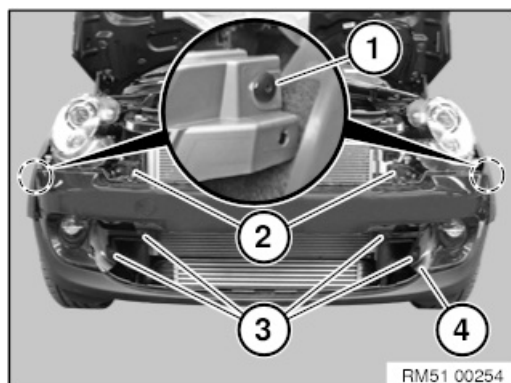
Disconnect plug connections, depending on version.

Remove bumper panel (3) towards the front with aid of a 2nd person.

Installation note:

Make sure foam insert is correctly positioned on support.

For adjustment, refer to Body gap dimensions.

**On vehicles from version 08/2010 (not R60/R61):**

Release screws (1 and 2).

Release expanding rivet (3).

Pull bumper panel (4) slightly towards the front with aid of a 2nd person.

Disconnect plug connections, depending on version.

Remove bumper panel (4) towards the front with aid of a 2nd person.

Installation note:

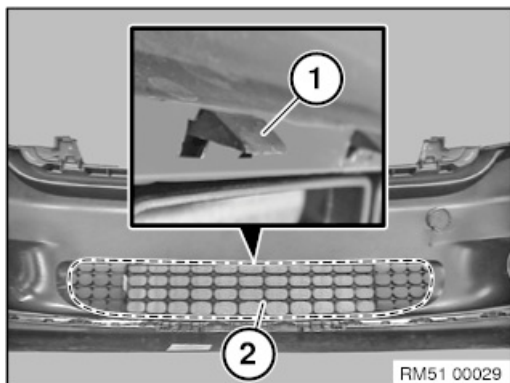
For adjustment, refer to Body gap dimensions.





Necessary preliminary tasks:

- Remove front bumper panel



Release latch mechanisms (1) and remove ornamental grille

(2). *Installation note:*

Latch mechanisms (1) on grille and bumper panel must not be damaged.

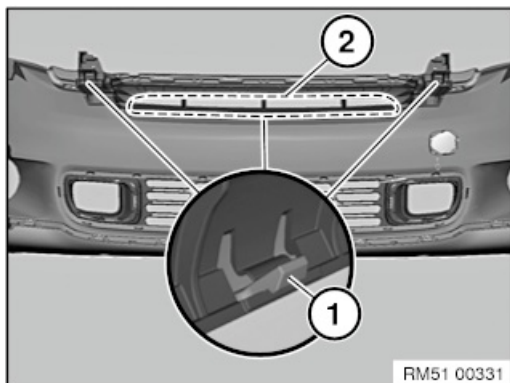


51 11 182 Removing and installing/replacing ornamental grille in bumper panel at top front



Necessary preliminary tasks:

- Remove front bumper panel



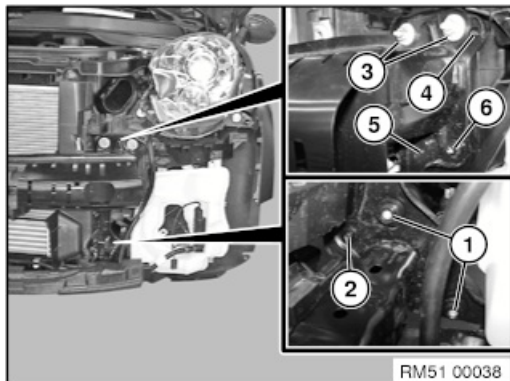
Release latch mechanisms (1) and remove ornamental grille (2). *Installation note:*

Latch mechanisms (1) on ornamental grille (2) and bumper panel must not be damaged.



**Necessary preliminary tasks:**

- Remove front bumper panel

**Note:**

The operation is described on the left side; proceed in the same way for the right side.

Release the screws (1 and 6) from the rear.

Tightening torque 51 11 4AZ.

Loosen screws (2 and 4).

Tightening torque 51 11 8AZ.

Loosen the nuts (3) from the front and the nut (5) from the back.

Tightening torque 51 11 3AZ.

Remove carrier for bumper trim

**Replacement:**

Modify impact absorber at top and bottom.



51 11 157

Replace bumper panel, front



Necessary preliminary tasks:

- Remove front bumper panel
- Swap over locator lights
- Swap over fog lights and adjust after fitting
- Swap over ornamental grille
- Swap over spoiler

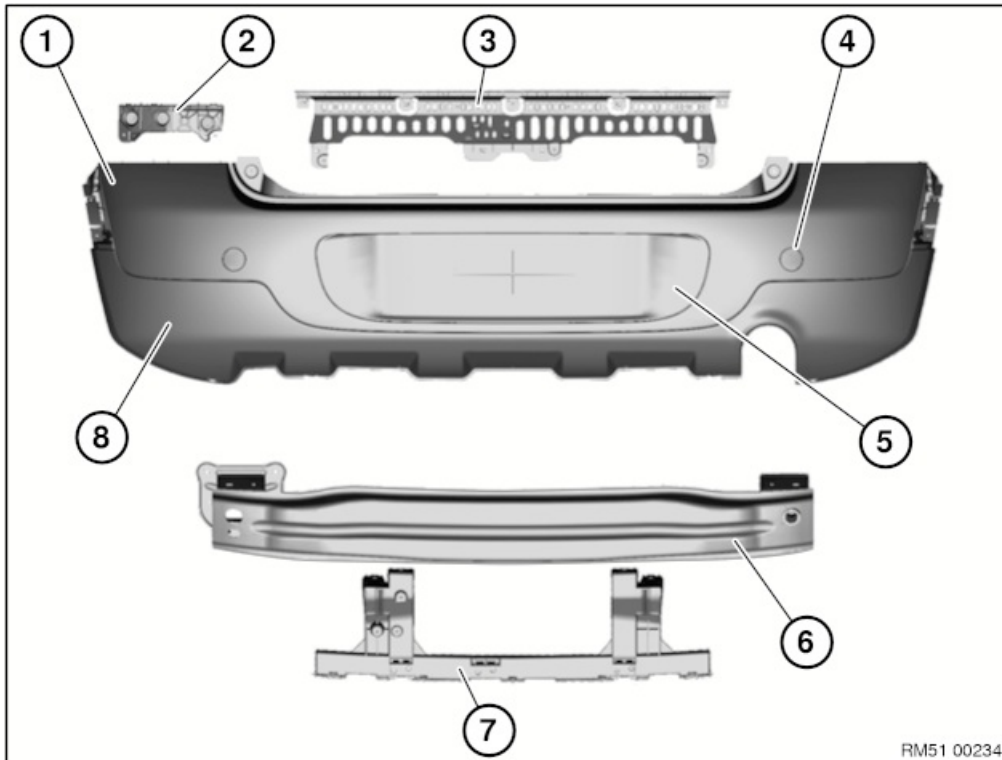


51 00 ... Overview of consumables (Electronic Parts Catalogue)

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Cleaning agent R2	Cleaning agent R2	83 19 0 417 324	500 ml
Lubricants G14	Lubricants G14	83 23 2 360 412	900 ml / Notes
Sika Activator 205	Aktivator 205	83 19 0 030 155	250 ml
Yellow plastic adhesive tape	Adhesive tape	83 19 9 410 979	A = 66 mm; B = 50 mm
Double-sided adhesive tape	Adhesive tape	54 11 2 290 978	L = 50 mm/W = 12 mm
Masking tape	Masking tape	81 22 9 400 181	L = 50 mm / W = 19 mm
Masking tape	Masking tape	81 22 9 400 388	L = 50 mm / W = 30 mm
Eraser disk	Scotch Brite eraser disk	51 91 0 402 946	with shaft
Cutting cord	Cutting cord	81 43 2 344 272	Notes
Adhesive set K6	Adhesive set K6	83 19 2 317 925	
Window glass adhesive	Window glass adhesive, cold, 1 hour	83 19 2 289 286	
Profile rubber adhesive		83 19 2 232 322	
Set of felt pads	Set of felt pads	51 45 2 353 024	

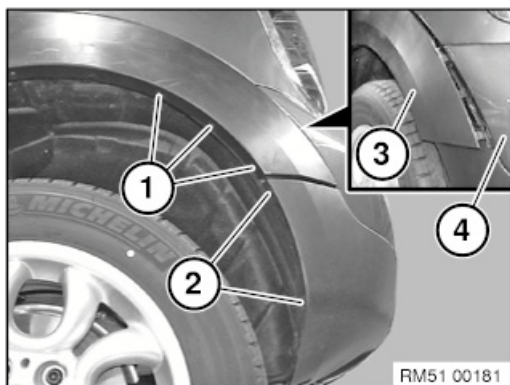


51 12 ... Overview of rear bumper



- | | |
|-----------------------------|----------------------------------|
| 1 Bumper trim | 5 License plate support |
| 2 Bracket for bumper (side) | 6 Support for bumper trim |
| 3 Guide for bumper (centre) | 7 Guide for rear bumper (centre) |
| 4 Towing eye flap | 8 Spoiler (centre) |



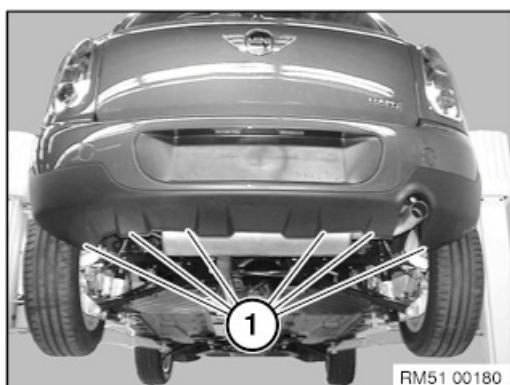


Release expanding rivets (1).

Release screws (2) and lever the cover (3) out of the bumper latch mechanism (4).

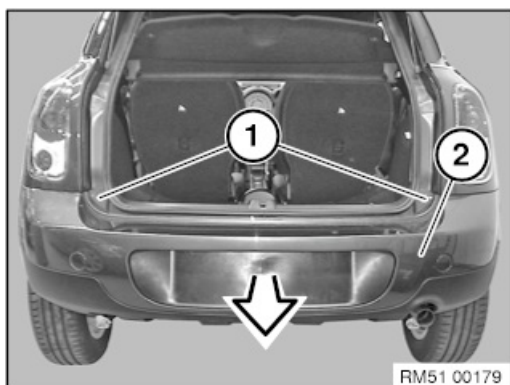
Installation note:

Replace expanding rivets (1).



Release expanding rivets (1). *Installation note:*

Replace expanding rivets (1).



Release screw (1).

Pull off the bumper panel (2) slightly towards the rear with aid of a 2nd person.

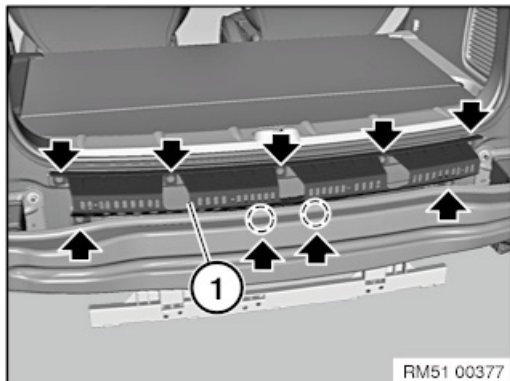
Disconnect the plug connections for the number-plate light and/or ultrasonic sensor.

Remove the bumper panel (2).



**Necessary preliminary tasks:**

- Remove rear bumper trim



Release screws.

Tightening torque 51 12 3AZ.

If necessary, disconnect the plug connection for the bumper aerial.

Remove guide (1).

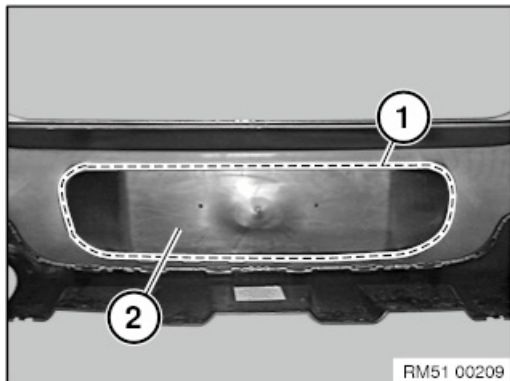
Replacement:

Modify the bumper aerial.

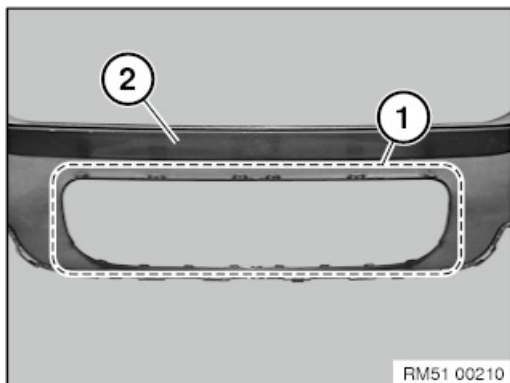


**Necessary preliminary work:**

- Remove bumper panel



Release latch mechanisms (1) and remove cover (2).

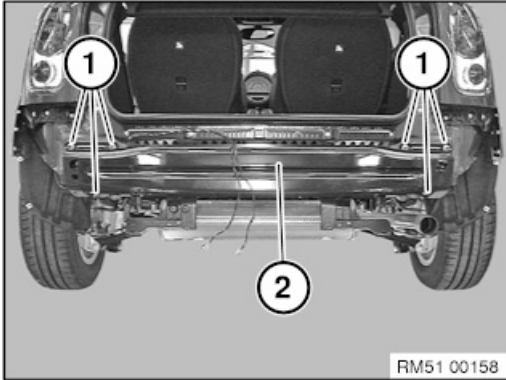
**Installation note:**

Latch mechanisms (1) on bumper panel (2) must not be damaged.



**Necessary preliminary tasks:**

- Remove bumper panel



If necessary, detach cable for ultrasonic sensor from support (2).

Release nuts (1) on left/right and remove support (2).

Tightening torque 51 12 1AZ.



**Necessary preliminary tasks:**

- Remove bumper panel
- Modify rear spoiler
- Modify towing eye cover

R60 only:

- Modify license plate support

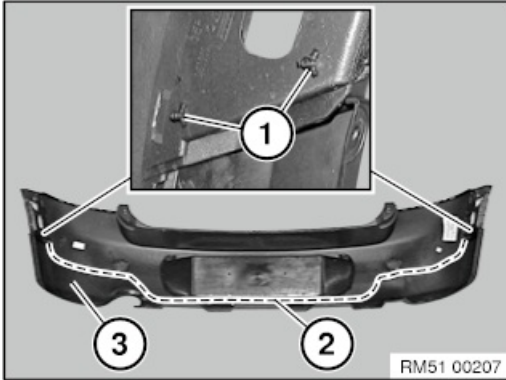
R61 only:

- Modify number plate light
- Fit rear reflectors from old component



**Necessary preliminary tasks:**

- Remove bumper panel

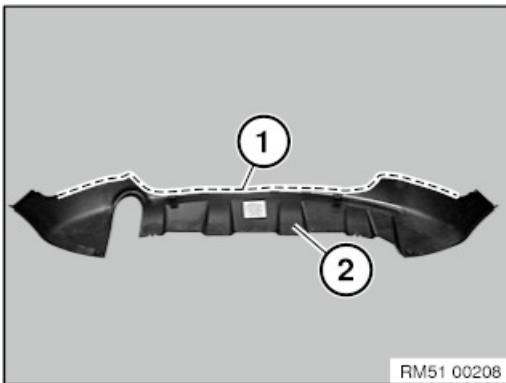


Release expanding rivets (1) on left/right.

Release all catches (2) and remove spoiler (3).

Installation note:

Replace expanding rivets (1).

*Installation note:*

Latch mechanisms (1) on spoiler (2) must not be damaged.



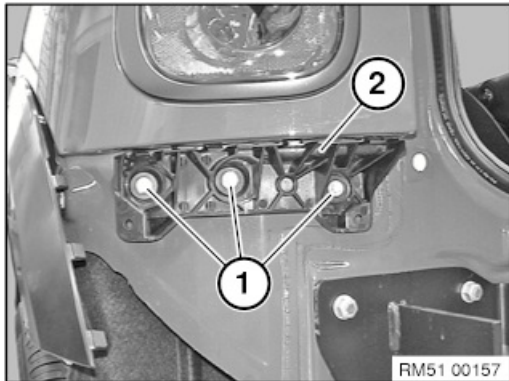
51 12 801

Replacing holder for rear bumper at left or right



Necessary preliminary tasks:

- Remove rear bumper trim



Release screws (1) and remove holder (2).
Tightening torque 51 12 2AZ.



51 13 305

Removing and installing / replacing left or right roof railing



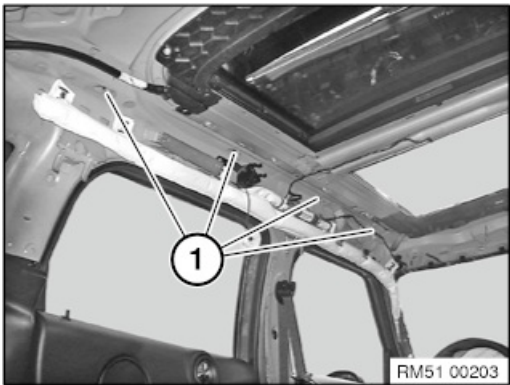
Special tools required:

- 00 9 460

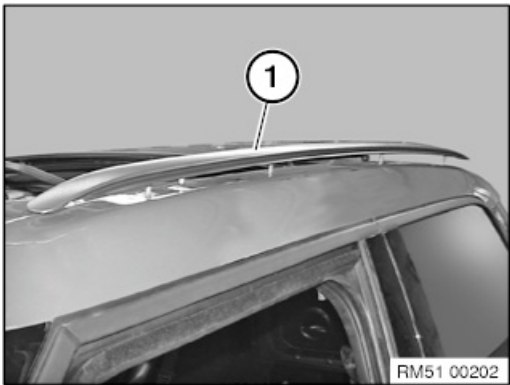


Necessary preliminary tasks:

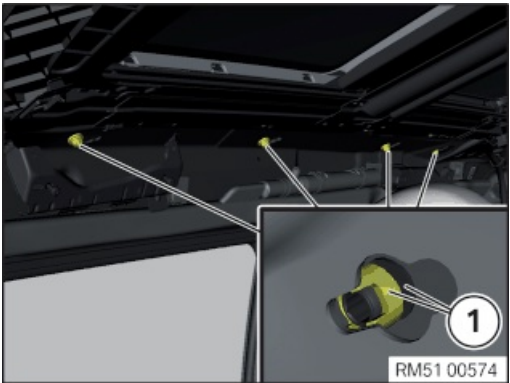
- Remove headlining



Slacken top nuts (1).
Tightening torque 51 13 5AZ.
Installation note:
Replace nuts (1).



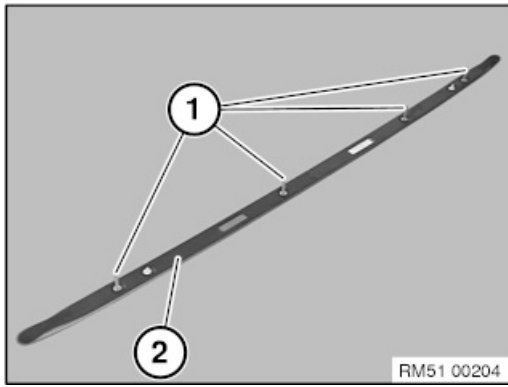
Remove roof rails (1).



Installation note:
Pretension valve clearance compensating elements (1) to a corresponding tightening torque with special tool 00 9 460 .

Position	Tightening torque
last valve clearance compensating element, rear left/right	0.4 Nm
remaining valve clearance compensating elements, left/right	0,5 Nm





Installation note:

Seals on roof railing (2) and threaded bolts (1) must not be damaged.



51 13 106 Removing and installing/replacing cover (wheel arch) at rear door, left or right

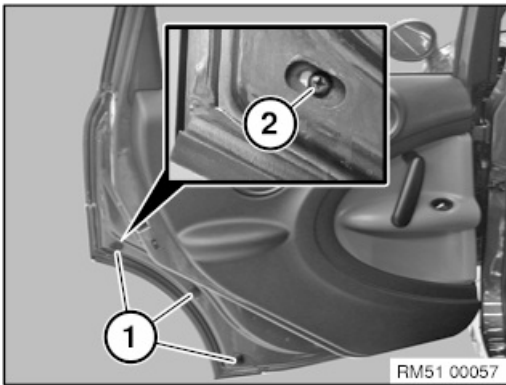


Special tools required:

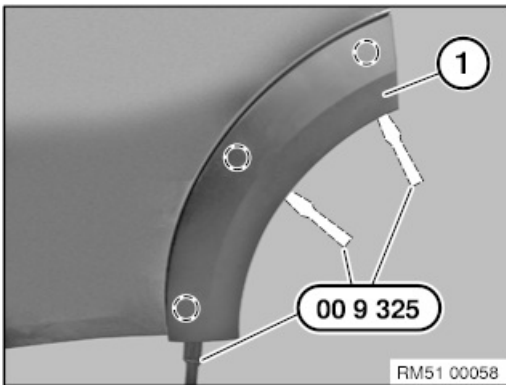
- 00 9 325



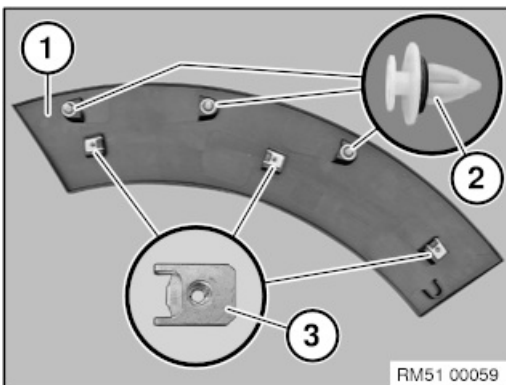
Do not scratch or damage visible surfaces.



Lever out rubber covers (1).
Release screws (2) below.
Tightening torque 51 77 1AZ.



Clip out cover (1) using special tool 00 9 325 beginning at the bottom.
When doing this, guide special tool 00 9 325 along outer door edge to the respective clip.



Installation note:

Sheet metal nuts (1) and clips (2) must not be missing or damaged.

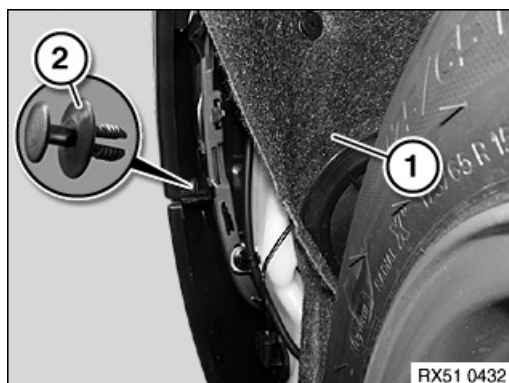
Replacement

- Modify sheet metal nuts (1) and clip (2)



51 13 102 wheel arch

Removing and installing/replacing cover on front left or right

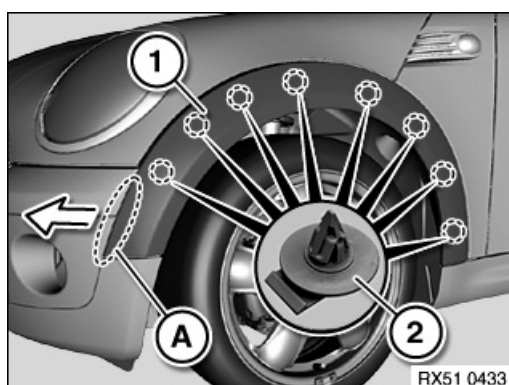


If necessary, release clip on front wheel arch cover (1).

Bend wheel arch panel (1) inwards slightly and release clip (2).

Installation note:

If necessary, replace faulty clip (2).



Feed cover (1) in area (A) towards front out of bumper.

Release cover (1) from clips (2); if necessary, disconnect associated plug connection and remove.

Installation note:

If necessary, replace faulty clips (2).



If replacing with USA national version:

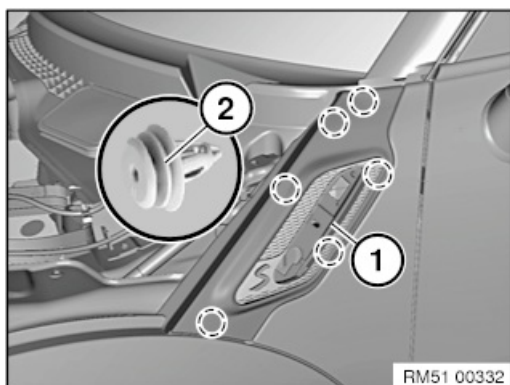
Remove side marker light.





Necessary preliminary tasks:

- Remove side repeater
- Remove trim strip from side wall
- Remove wheel arch cover in side wall area



Release cover (1) at clips (2) and remove. *Installation note:*
Replace faulty clamps (2).



51 13 375 Removing and installing/replacing cover on left or right rear roof pillar (D-pillar)



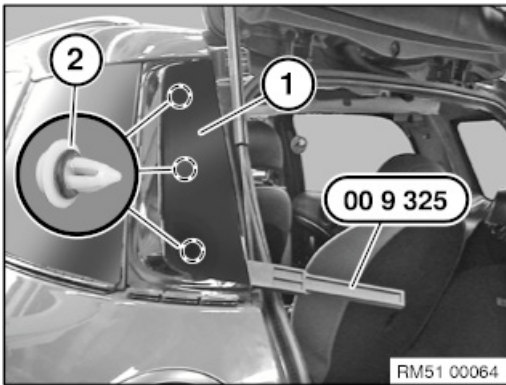
Special tools required:

- 00 9 325



Necessary preliminary tasks:

- Remove strip on side window

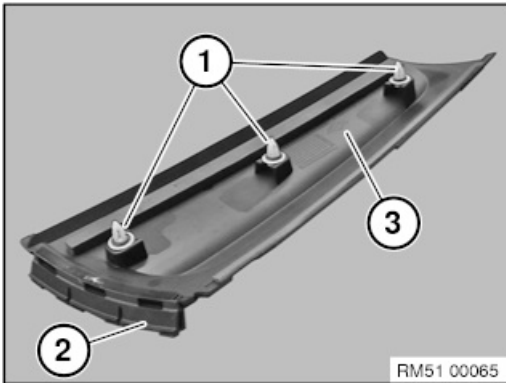


Important!

Risk of damage!

Ensure temperature equalization; covers which are too cold can be damaged when removed.

Position special tool 00 9 325 as closely as possible to clips (2) and lever out cover (1) with a short sharp jerk.



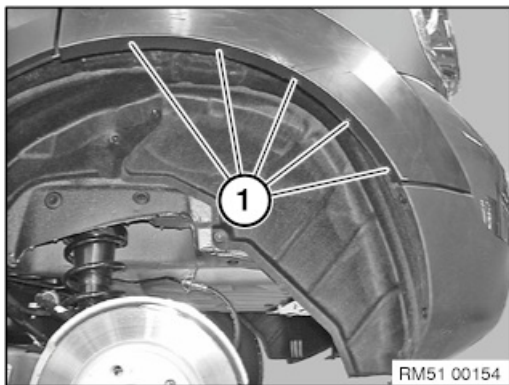
Installation note:

Replace faulty clips (1) on cover (3).

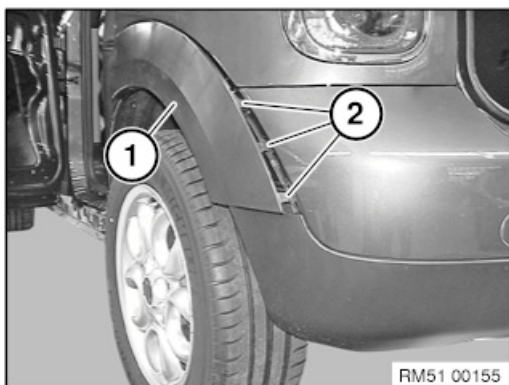
Replacement:

Modify holder (2).

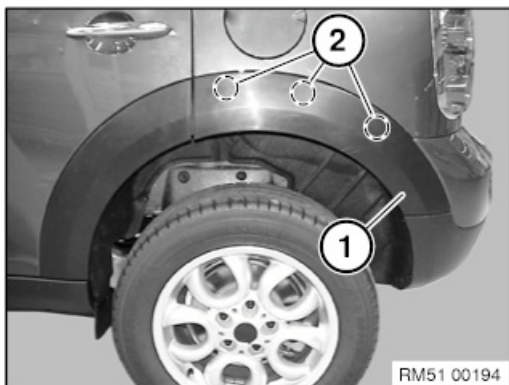




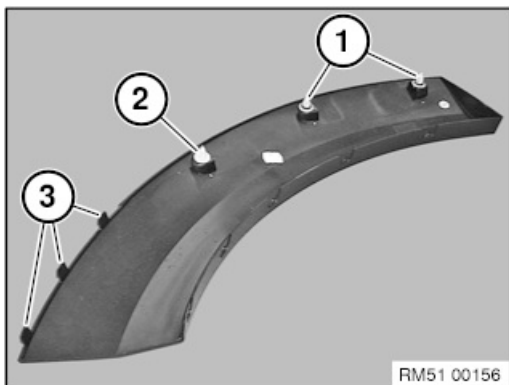
Release expanding rivets (1).



Release cover (1) from latch mechanism (2).



Carefully release cover (1) from clip (2).

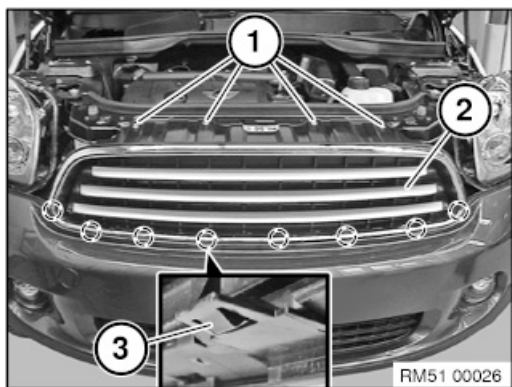


Installation note:

Replace clips (1) (with rubber sealing ring) and clip (2) of cover.

Latch mechanisms (3) must not be damaged.

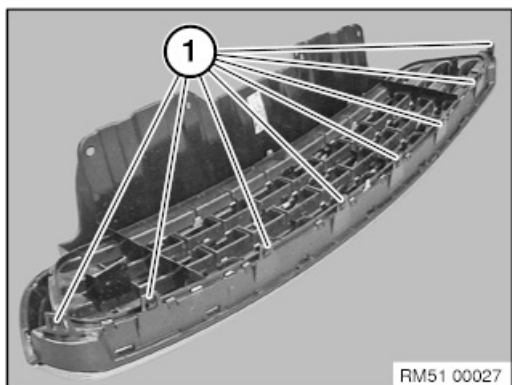




Release screws (1).

Tightening torque 51 13 6AZ.

Release front ornamental grille (2) out of the lower latch mechanisms (3) with a forceful pull forward.



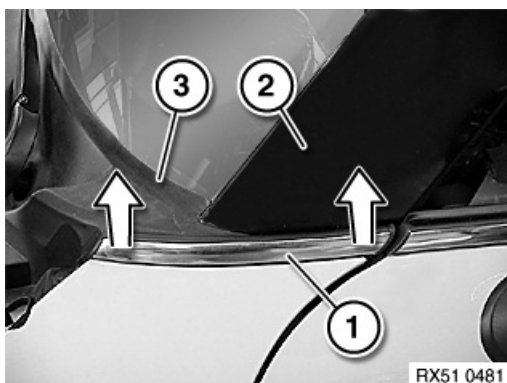
Installation note:

Latch mechanisms (1) must not be damaged.



51 13 091 or right

Removing and installing/replacing front side panel trim strip, left



Apply adhesive tape to the side wall below the trim strip (1)

Lift the trim strip (1) out toward the top with a suitable tool.

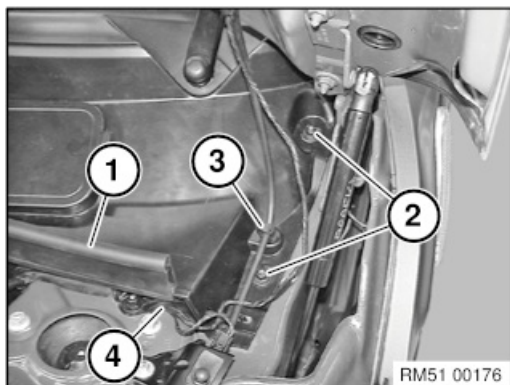
Installation note:

Make sure the cover (2) is correctly seated on the cowl panel cover (3).



**Necessary preliminary tasks:**

- Remove right cowl panel cover
- Remove both windscreen wiper arms



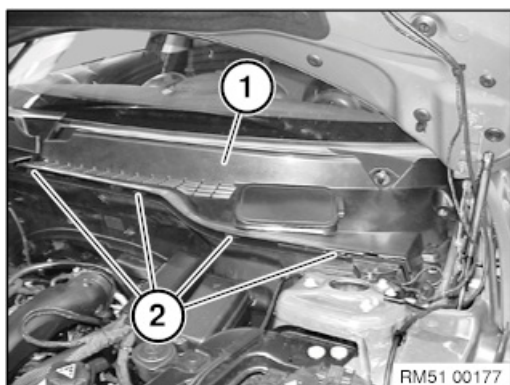
Remove seal (1) in the area of the cowl panel cover.

Unscrew nuts (2).

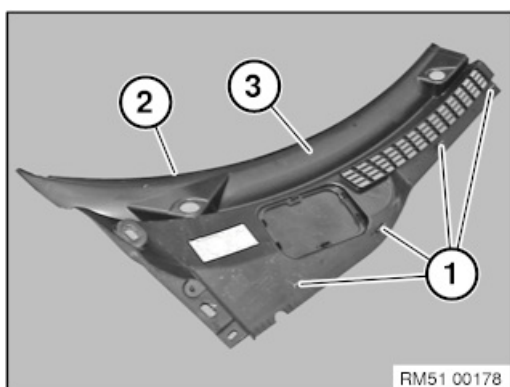
Detach cable assembly from holder (3).

Installation note:

Lay lines (4) correctly.



Release cover (1) upwards from guides (2) and feed out towards front.



Installation note:

Ensure cover (3) is correctly seated.

Guides (1) and seal (2) on cover (3) must not be damaged.

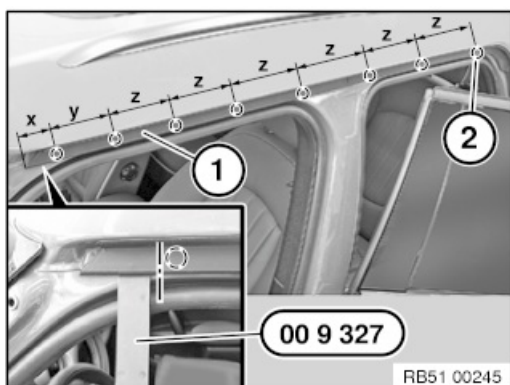


**Special tools required:**

- 00 9 327

**Necessary preliminary work:**

- Remove cover for A-pillar (outside)



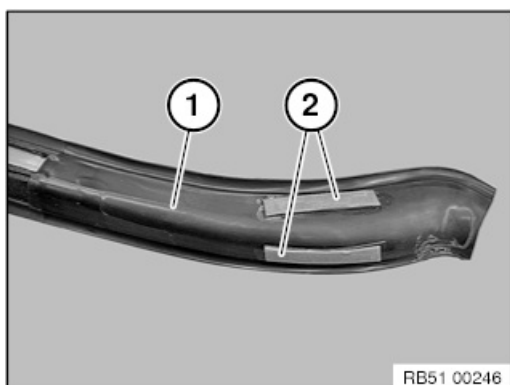
Beginning at the front, set roof strip (1) right in front of the clip position with special tool 00 9 327 and attach clip.

Distance between the applicable clip positions:

Distance	x	y	z
in mm	60	170	160

Installation note:

Begin mounting the roof strip (1) at clip position (2). Clip is used to fasten the roof strip (1).

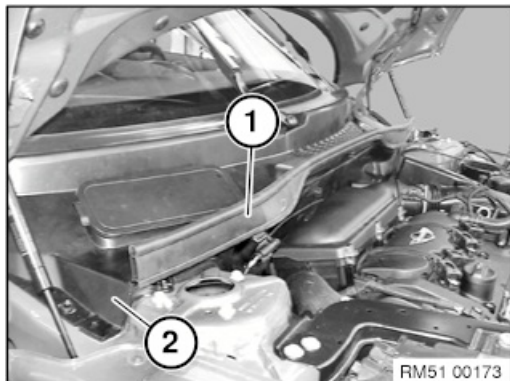
*Installation note:*

Adhesive strips (2) on the rear roof strip (1) must not be damaged or missing.

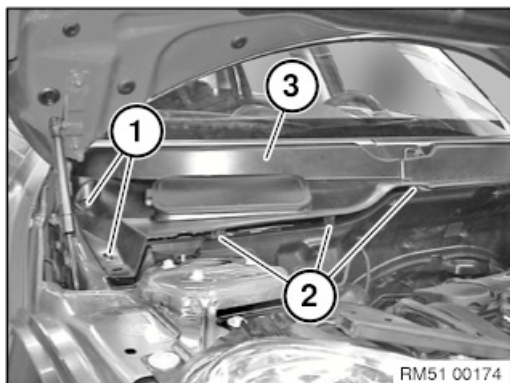


**Necessary preliminary work:**

- Remove right wiper arm

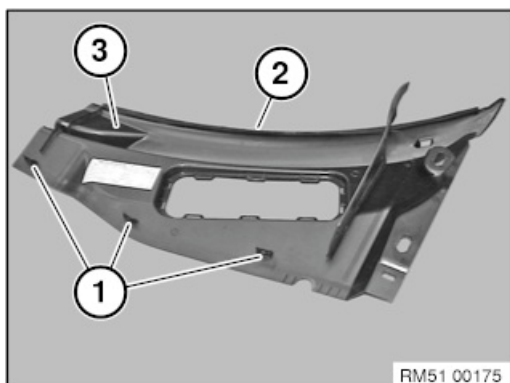


Remove seal (1) in the area of cover (2).



Unscrew nuts (1).

Release cover (3) upwards from guide (2) and feed out towards front.

**Installation note:**

Ensure cover (3) is correctly seated.

Guides (1) and seal (2) must not be damaged.



51 13 ... Removing and installing/replacing seal on rear door (in area of wheel arch), left or right



Necessary preliminary work:

- Remove trim cover on rear door

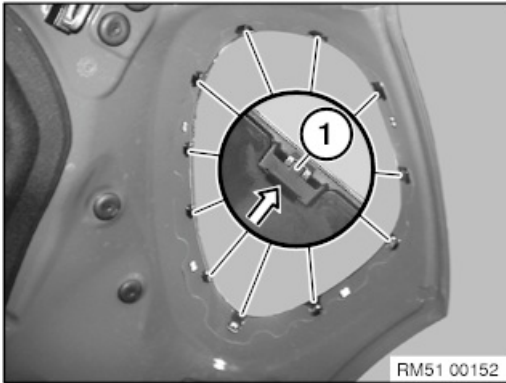


Pull off seal (1).

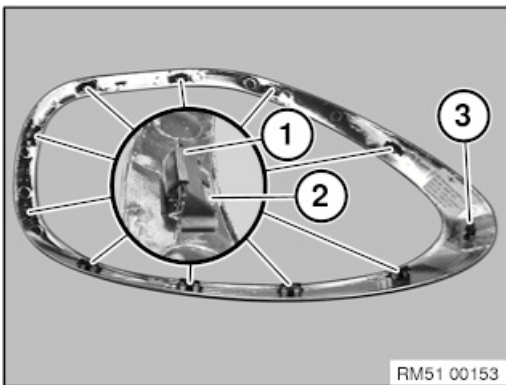


51 13 015 headlight

Removing and installing/replacing trim ring for left or right



Release clip (1) in direction of arrow.
Remove trim ring.



Installation note:

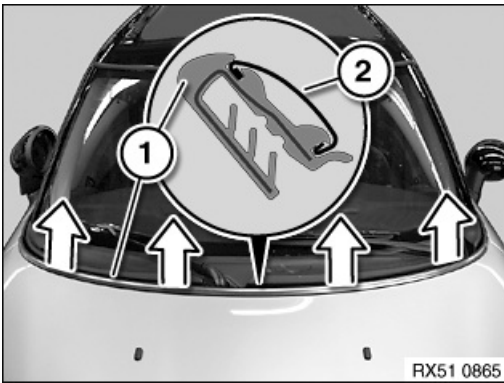
The clip (1) , guide (2) and centring (3) must not be damaged.

Replace faulty clips.

Mount trim ring with pre-installed clips (1) on engine compartment lid.



51 13 085 Removing and installing/replacing trim strip on engine hood/bonnet (cowl panel)



Important!

Risk of damage!

Do not bend trim strip (1) and chrome strip (2) during removal.

Carefully detach trim strip (1) in direction of arrow from hood/bonnet. *Note:*

To remove, if necessary tape off hood/bonnet with adhesive tape and remove trim strip (1) with a suitable tool.

Installation note:

Make sure chrome strip (2) is correctly seated on trim strip (1), reinstall chrome strip (2) if necessary.

Pay attention to centre marking on trim strip (1) and hood/bonnet.



51 14 ... General notes for labelling with adhesive films

In the event of a repair the adhesive films must be partially or completely replaced. The basic procedure for all areas of the vehicle is described below.

In addition, vehicle-specific repair instructions are available.

1. Preparation:

Wash and dry vehicle. Rework with compressed air as required in area of joints.

Clean complete component surface with glass cleaner (BMW part number 83 12 0 396 775). Also clean the inside of the component in areas, in which adhesive films are applied.

Only carry out repair work with clean hands!

Important!

Labels can only be applied to recently painted components after a waiting period of **2 weeks**. The paint hardening is only fully completed after this time.

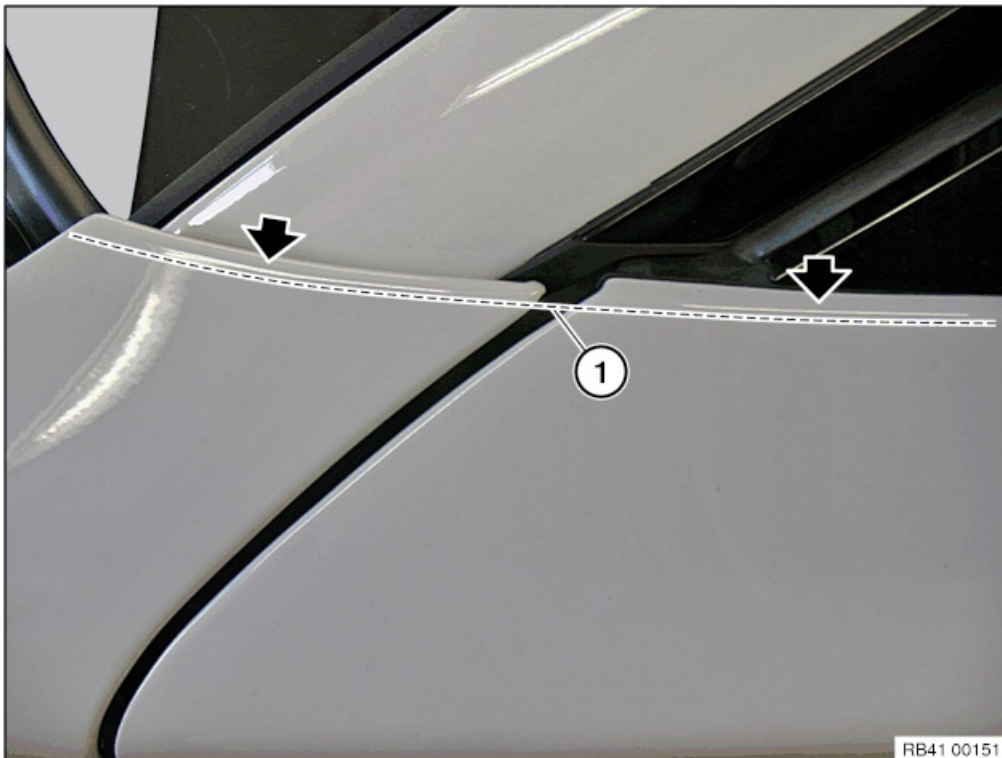
2. Procedure for applying labels:

All adhesive films in the repair kit are marked with numbers. Prepare the required plastic films prior to start of repairs.

The templates included in the repair kit assist orientation. A straight line running over the different components is the top priority.

Pull off the templates positioning of the adhesive films.

Only throw away templates after completion of all repair work, as some templates are used several times.



Templates are always applied along the light edge (1). The light edge is the reflection of the light source in radius (see arrow).

Roughly align the adhesive film using a template.

For large adhesive films, pull off the first 20 cm of protective film and fold back the edge.

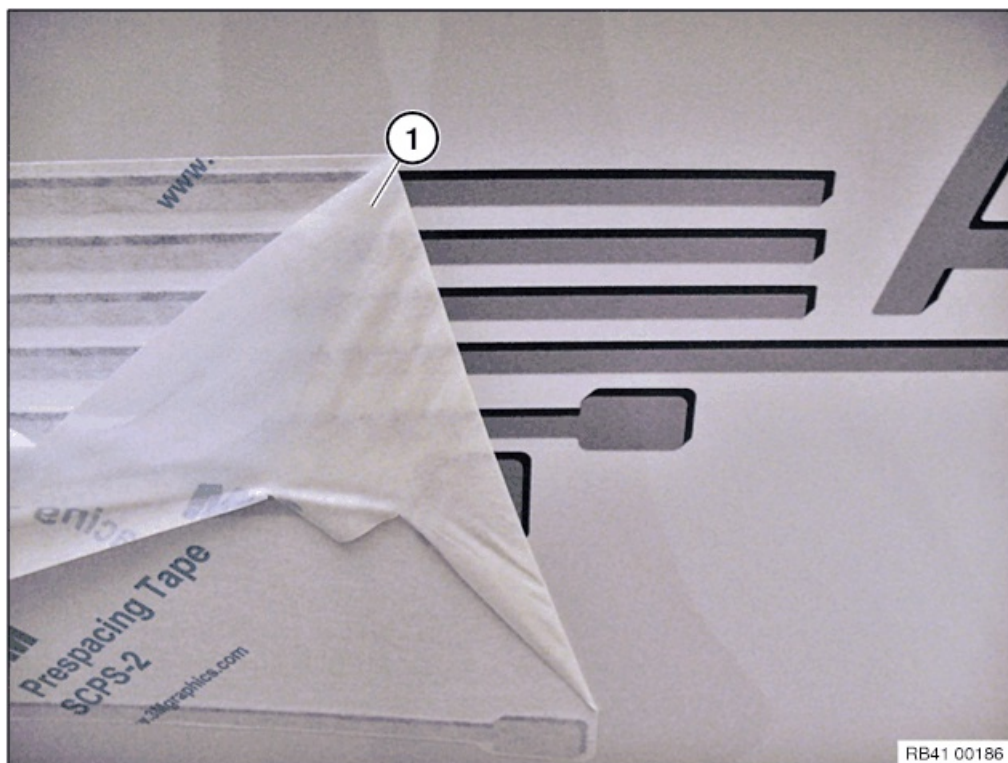
Align and lightly press down the adhesive film. Use only one finger for this and not the entire hand so that air pockets are unable to form under the adhesive film.

Pull off the remaining protective film and press down the adhesive film from front to rear and from inside to outside.



If faults are made in applying the adhesive film, it can be pulled off and repositioned several times. When no further corrections have to be made, use a squeegee to press down the adhesive film firmly from inside to outside.

Lay protruding ends of the adhesive film around the component edge and press down firmly.



Carefully pull off backing film (1) at an acute angle.



**Note:**

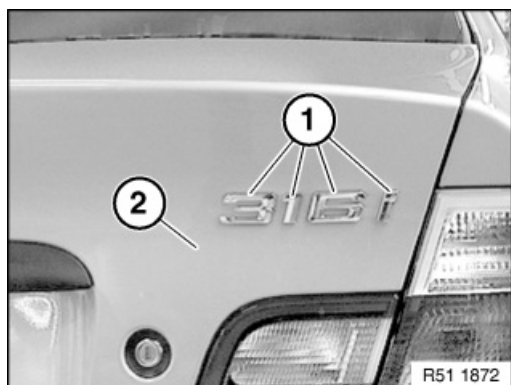
The model designation is attached with adhesive and can not be reused.

The model designation must be attached at room temperature $\geq \pm 18^\circ\text{C}$.

The model designation must be removed at stove-enameling temperatures exceeding 80°C .

Note:

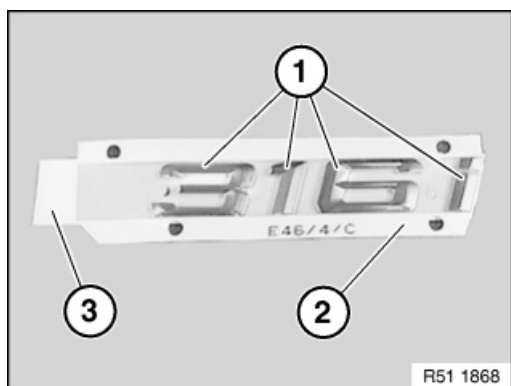
The following work steps are described using the "316 i" as the example.

**Removing:**

Coat nylon string or strong yarn with tensides (e.g. washing-up liquid).

Cut through adhesive layer and remove model designation (1) from rear lid (2).

Remove remainder of adhesive layer with adhesive remover (sourcing reference: BMW Parts Service).

**Assembly:**

Number and letter combinations (1) of the model designation are not connected to each other and are supplied on a carrier film (2).

Important!

Adhesive areas must be dry and free of dust and grease.

Once it has been cleaned, do not touch the adhesive area with bare hands.

Remove liner (3) (protective strip for adhesive surface).

Firmly press down model designation.

Remove carrier film (2).



**Special tools required:**

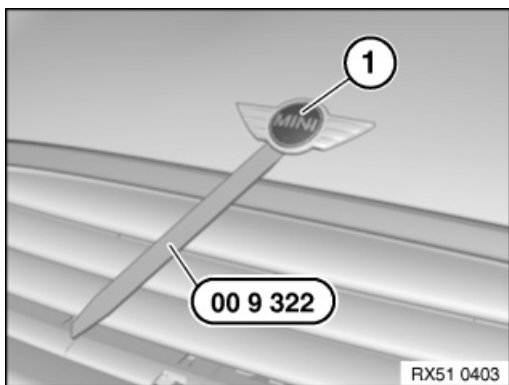
- 00 9 322

**Important!**

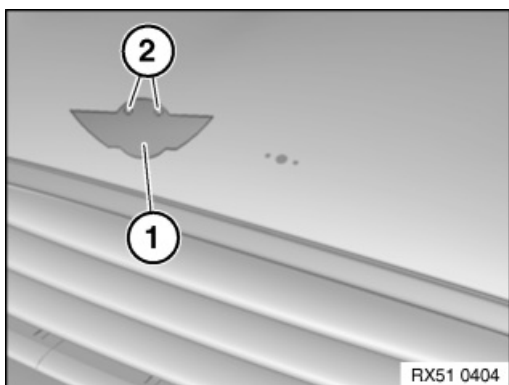
The notes on component bonding with double-sided adhesive tape serve as the basis for this repair instruction and must be observed without fail.

Note:

The MINI badge is damaged during disassembly and must be replaced.

**Removal:**

Heat MINI badge (1) with hot air blower and carefully lever out with special tool 00 9 322 .

**Installation:**

Pull off the Liner* from the adhesive tape (1) and place the MINI badge over the guide pins (2) on the Front compartment lid and press down firmly.

* Liner is the protective film on a new MINI badge.



**Special tools required:**

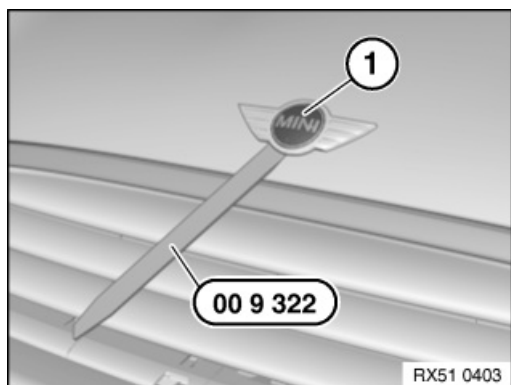
- 00 9 322

**Important!**

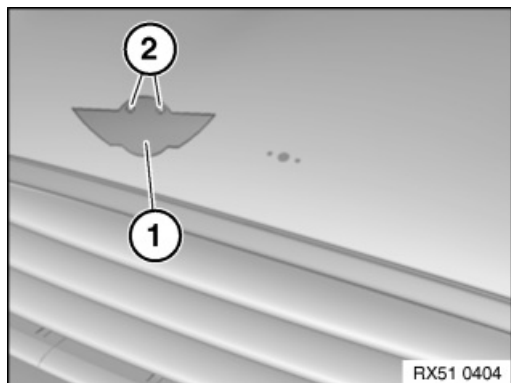
The Instructions on component cementing with double-sided adhesive tape serve as the basis for this repair instruction and must be observed without fail.

Note:

The MINI badge is damaged when removed and must be replaced.

**Removing badge:**

Heat MINI badge (1) with hot air blower and carefully lever out with special tool 00 9 322 .

**Fitting badge:**

Pull liner* off adhesive tape (1), position badge over guide pins (2) on hood/bonnet and press down firmly.

* Liner is the protective film on a new plate.

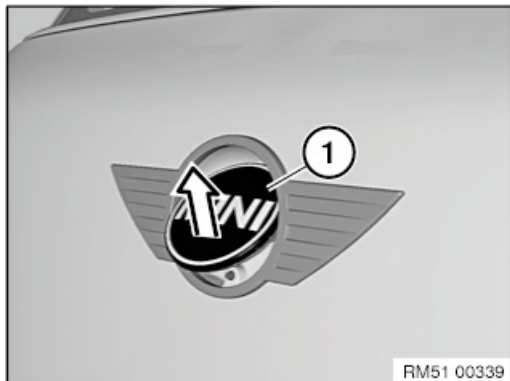


51 14 012 Removing and installing/replacing rear MINI plate



Special tools required:

- 00 9 327



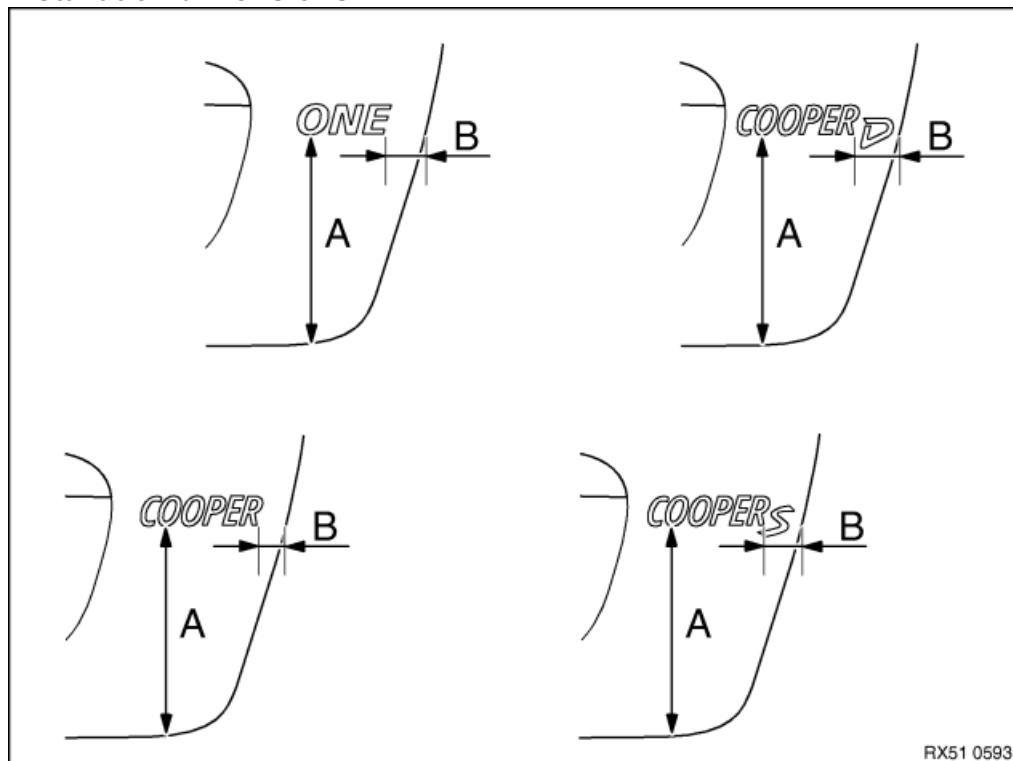
Move rear lid actuation into position shown.

Unclip plate (1) with special tool 00 9 327 in direction of arrow.



**Important!**

The Instructions for adhering badge emblem serve as the basis for these repair instructions and must be followed without fail.

Installation dimensions:

RX51 0593

Mark position of model designation with adhesive tape using dimensions (A and B).

Position model designation on mark and stick on.

	A	B
One	111 mm	78 mm
Cooper	111 mm	64 mm
Cooper S	111 mm	77 mm
Cooper D	111 mm	85 mm
Cooper SD	125 mm	81 mm





Mark position of model designation with adhesive tape using dimensions (A to C).
Position model designation on mark and stick on.

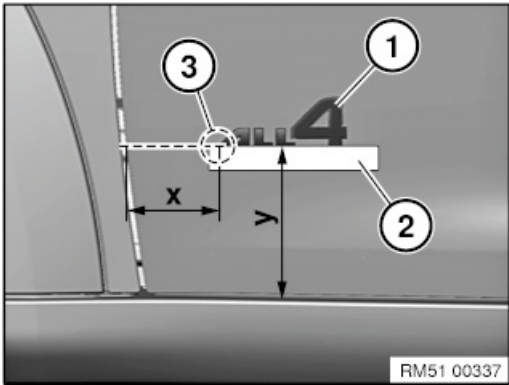
- A 95 mm
- B 138 mm
- C 93 mm



51 14 006 Replacing badge emblem on left or right front door



Important!
The Instructions for adhering badge emblem serve as the basis for these repair instructions and must be followed without fail.



Left door

- 1 = Lettering
- 2 = Adhesive tape
- 3 = Point of intersection of x and y

Dimensions	x	y
in mm	80	136

Attach the upper edge of the adhesive tape (2) offset upward by dimension "y" horizontally to the lower edge of the door.

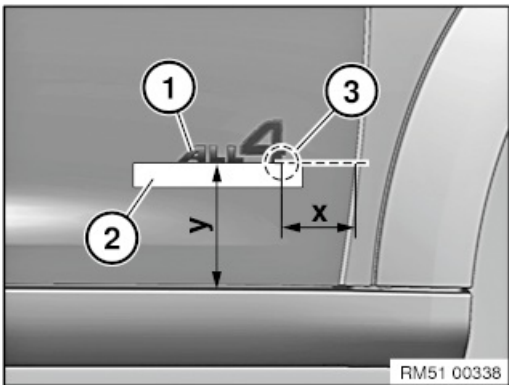
Mark dimension "x" on adhesive tape (2).

Affix lettering (1) as follows:

- Lower edge of lettering (1) with upper edge of adhesive tape (2)
- Outer lower corner point of lettering (1) with point of intersection (3)

Affix lettering (1).

Remove adhesive tape (2).



Right door

- 1 = Lettering
- 2 = Adhesive tape
- 3 = Point of intersection of x and y

Dimensions	x	y
in mm	80	136

Procedure same as for left-hand door.



51 16 ... Calibrating the compass on the inside mirror



Note:

It may be necessary to alter the magnetic deflection zone if the vehicle is more than two ranges away from the set deflection zone.

For numbers of magnetic deflection zone, refer to operating instructions.

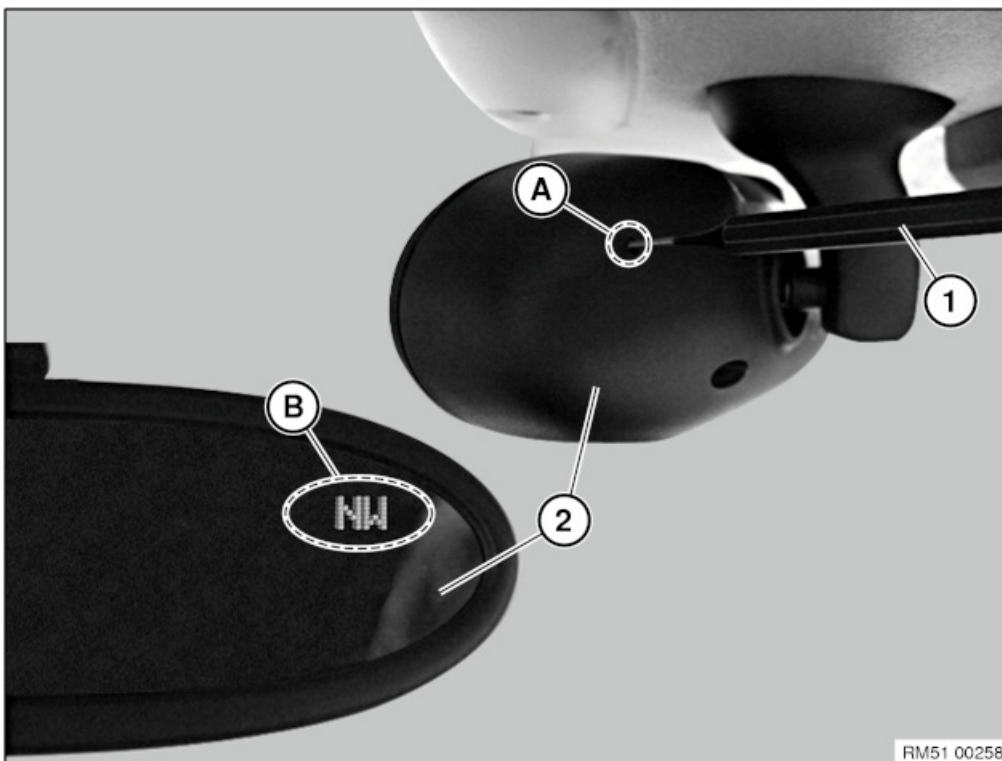
It may be necessary to calibrate the compass if:

- "C" appears in compass display
- there is no compass display
- not all compass directions are displayed correctly

Different time-based adjustment menus can be obtained by means of the control button:

- 0 to 3 seconds: Display ON/OFF
- 3 to 6 seconds: Adjustment of the magnetic field zones (0 -15)
- 6 to 9 seconds: Calibration (C)
- 9 to 12 seconds: Right-hand drive or left-hand drive vehicles (R or L)
- 12 to 15 seconds: English or German (E or O)

For further information, see System description.



Adjusting magnetic field zone:

Press and hold down control button (A) on inside mirror (2) with a suitable tool (1) for 3--6 seconds.

The currently set magnetic field zone is indicated in the compass display (B) (default setting "8" for Central Europe).

Release control button (A) briefly and select magnetic field zone (1-15) by pressing control button (A) again.

Release setting button (A) when the desired magnetic field zone is selected.

The selection menu is automatically exited after approx. 5 seconds.

The compass must be recalibrated after the magnetic field zone has been changed.

Setting right-hand drive or left-hand drive vehicle:



Press and hold down control button (A) on inside mirror (2) for 9-12 seconds.

The currently set vehicle type is indicated in the compass display (B) (default setting "L" for left-hand drive vehicle).

Release setting button (A) briefly and select vehicle ("L" or "R") by pressing setting button (A) again.

Release setting button (A) when the desired vehicle type is selected.

The selection menu is automatically exited after approx. 5 seconds.

The compass must be recalibrated after the right/left hand drive vehicle setting is made..

Setting language of compass display:

Press and hold down control button (A) on inside mirror (2) for 12--15 seconds.

The currently adjusted language is indicated in the compass display (B) (pre-adjustment "E" for English).

Release setting button (A) briefly and select language (E for English or O for German) by pressing setting button (A) again.

Release setting button (A) when the desired language is selected.

The selection menu is automatically exited after approx. 5 seconds.

Calibrating compass:

Press and hold down setting button (A) on inside mirror (2) for 6-9 seconds.

Release setting button (A) as soon as "C" is indicated in the compass display (B).

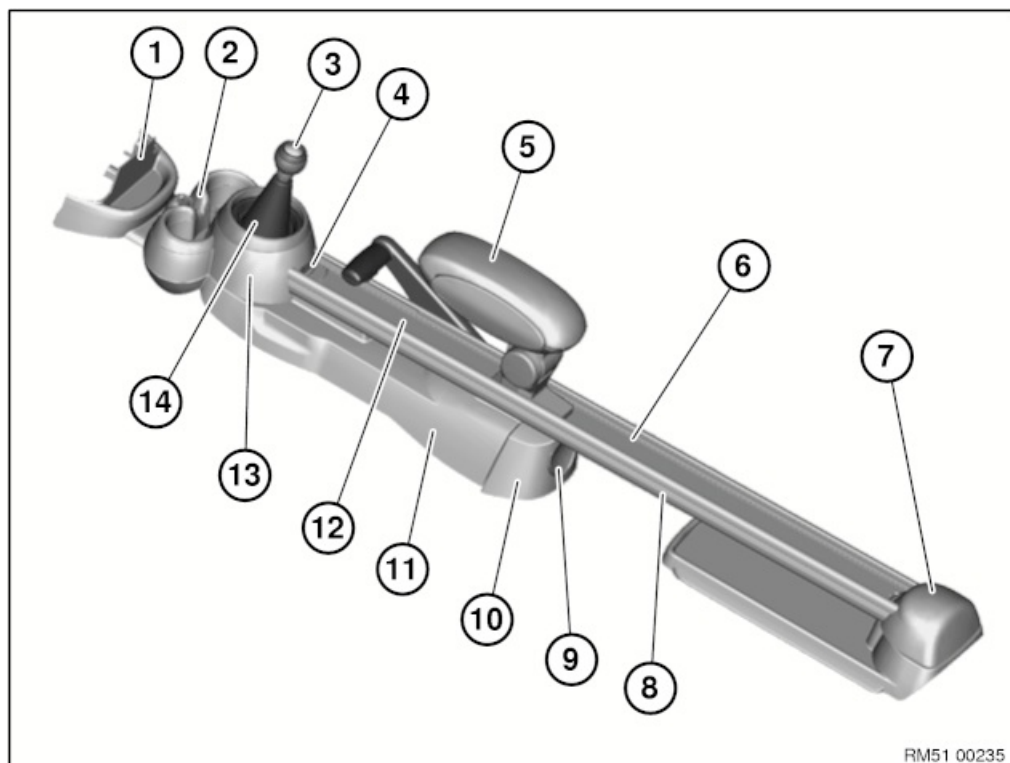
Drive vehicle 2 to -3 times in a full circle at approx. 7-10 km/h.

The circle must be at least twice the vehicle's turning circle.

Calibration is complete as soon as a valid direction is displayed.



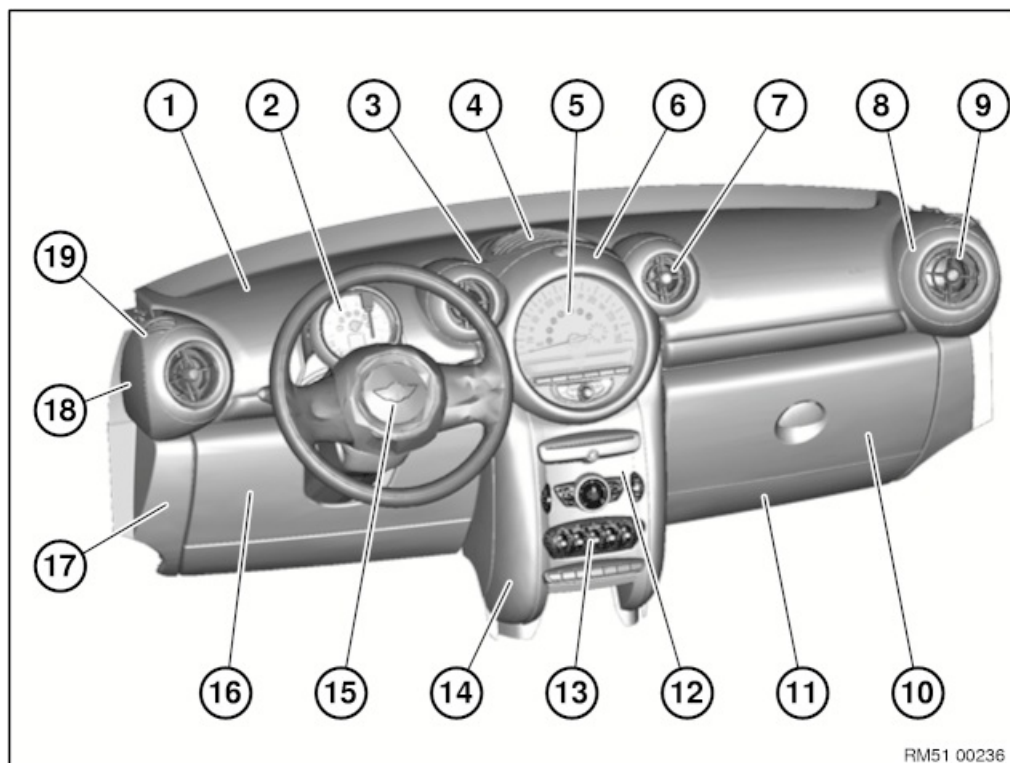
51 16 ... Overview of centre console



- | | |
|--|---------------------------------|
| 1 Centre console | 8 Rail |
| 2 Charging socket / cigarette lighter (see front can holder) | 9 Service cap |
| 3 Gearshift lever knob / handle for selector lever | 10 Cover, centre console (rear) |
| 4 AV connection socket | 11 Centre console |
| 5 Centre armrest | 12 Inserted mat, front |
| 6 Inserted mat, rear | 13 Cup holder, front |
| 7 Stop (see rail) | 14 Gearshift lever cover |



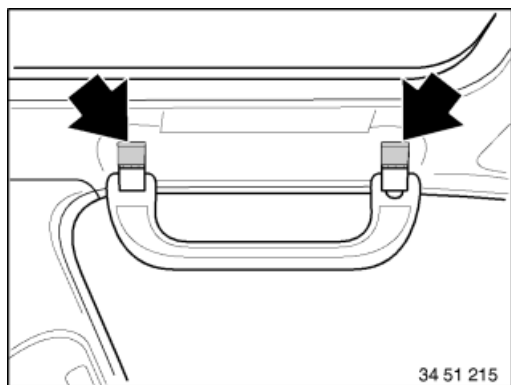
51 45 .. Overview of dashboard



- | | |
|--|--|
| 1 Dashboard trim panel | 11 Bottom right instrument panel trim |
| 2 Revolution counter | 12 Trim, centre console |
| 3 Instrument panel cover | 13 Centre console control panel |
| 4 Centre air duct cover (see centre console cover) | 14 Decorative trim for centre console (see centre console cover) |
| 5 Instrument panel control unit | 15 Sport / steering wheel |
| 6 Cover, instruments | 16 Bottom left instrument panel trim |
| 7 Fresh-air grille, middle | 17 Instrument panel side trim (see lid / cover for air vent) |
| 8 Cover, air vent, side | 18 Lid / cover, air vent, (side) |
| 9 Fresh air grille (side) | 19 Cover, air vent (side) |
| 10 Glove compartment | |



51 16 480 Removing and installing or replacing front grab handle



Fold finishers down and unfasten screws.





Version with remote key for central locking system:

If necessary, disconnect negative lead from battery.

Version with compass:

Check compass function if replacing or after disconnecting inside mirror plug connection or battery.

If necessary, calibrate compass in interior rearview mirror.



Important!

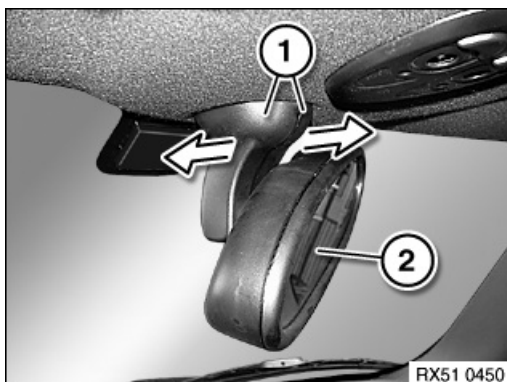
To avoid windscreen breakage:

Snap out (press) inside mirror only in direction of travel towards windscreen.

Do not under any circumstances twist the mirror base when removing.

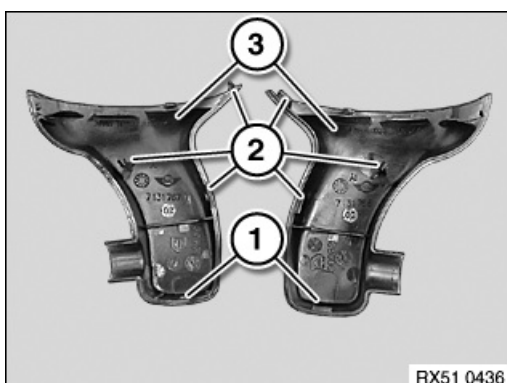
Twisting the inside mirror off the mirror base will damage the rear catch.

If the rear catch is damaged, the inside mirror will be loose when installed and must be replaced.



Separate end caps (1) in direction of arrow from each other.

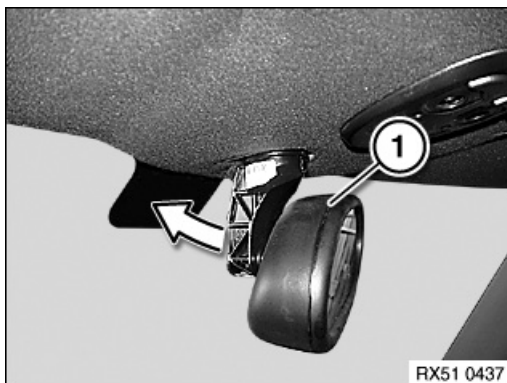
Turn inside mirror (2) and remove end caps (1).



Installation note:

Latch mechanisms (1 and 2) of end caps (3) must not be damaged, replace if necessary.



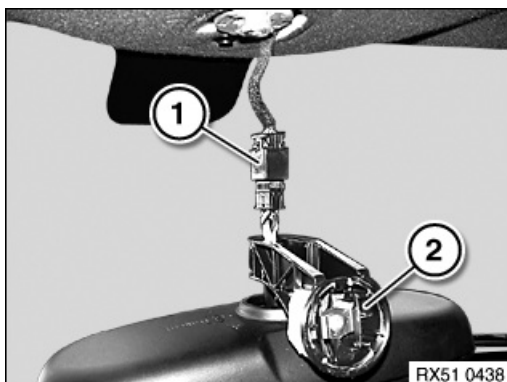


Important!

Risk of damage!

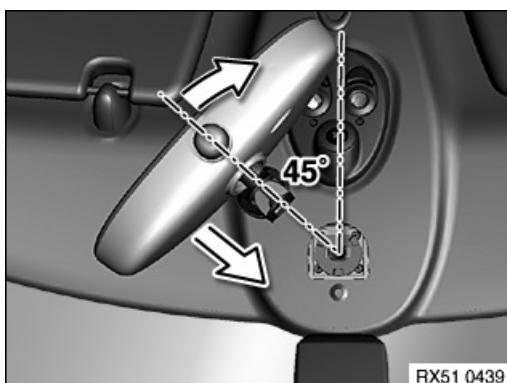
Do not snap inside mirror (1) out of mirror base by turning.

Snap out inside mirror (1) from mirror base towards front with increasing pressure (not abruptly) and remove.



Version with cable (X):

Disconnect plug connection (1) and remove inside mirror (2).



Installation note:

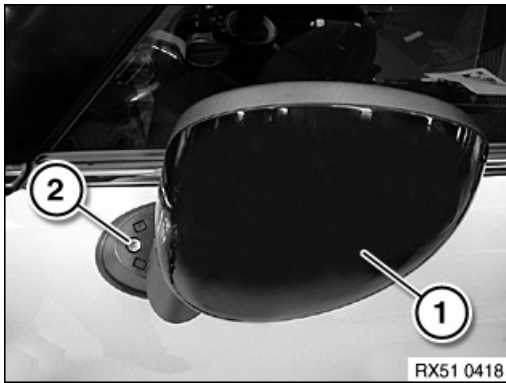
1. Twist mirror foot by approx. 45° and fit to mirror base .
2. Turn mirror base until it engages on mirror mount.



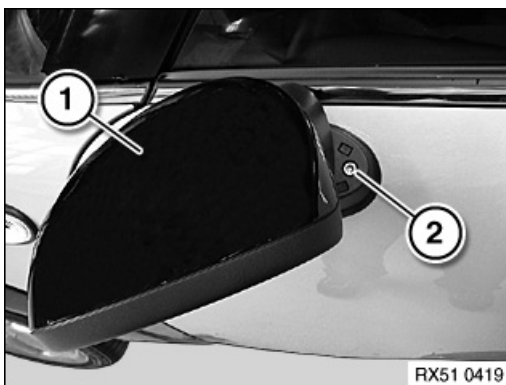
Only replace with version with remote key for central locking system:

Initialise all transmitters (ignition keys), refer to Owner's Handbook.

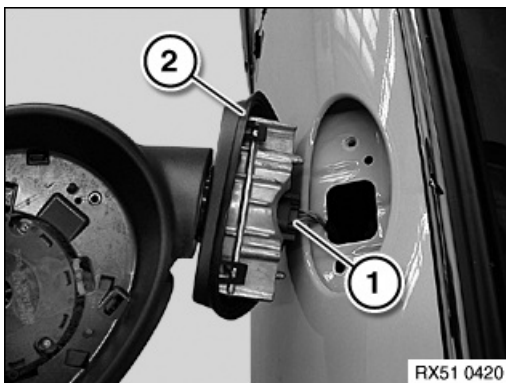




Fold rearview mirror (1) to back.
Release screw (2).
Tightening torque 51 16 3AZ.



Turn rearview mirror (1) to front.
Release screw (2).
Tightening torque 51 16 3AZ.



Pull out mirror.
Disconnect plug connection (1) and remove mirror.
Installation note:
Seal (2) must not be damaged.

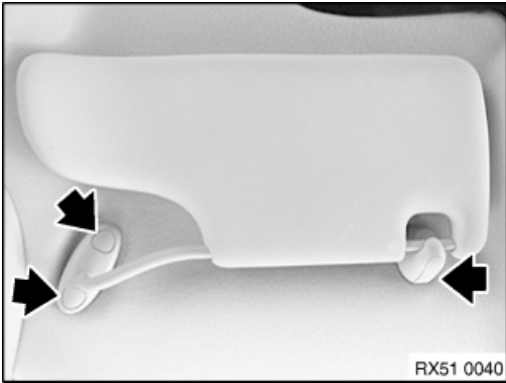


Replacement:

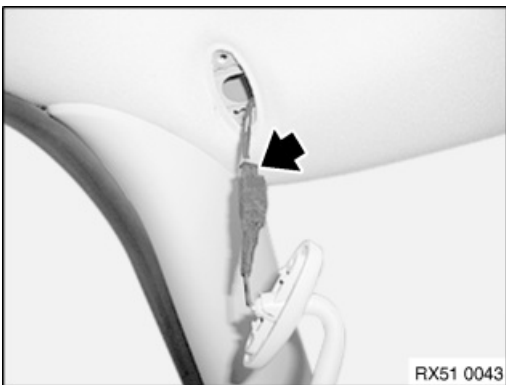
- Modify drive for exterior mirror
- Convert housing on exterior mirror



51 16 080 Removing and installing or replacing sun visor and left or right counter support



Release covers and release screws underneath.
Remove sun visor and counter support.



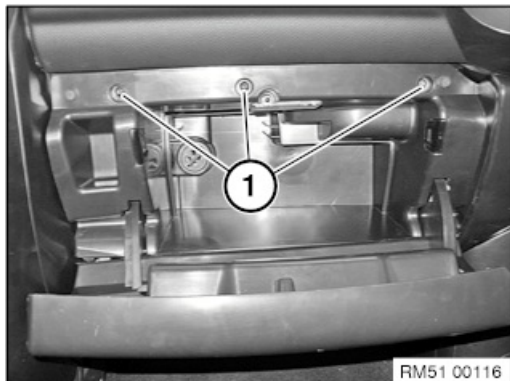
Version with interior light package:

Unlock plug connection for sun visor and disconnect.

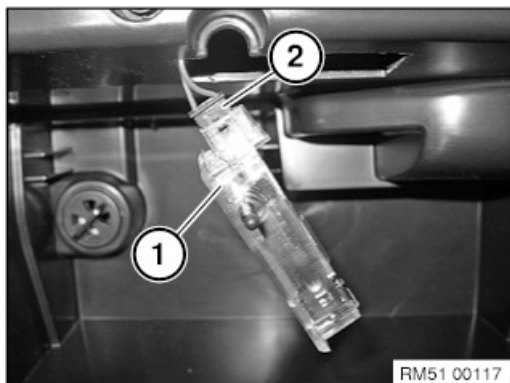


**Necessary preliminary tasks:**

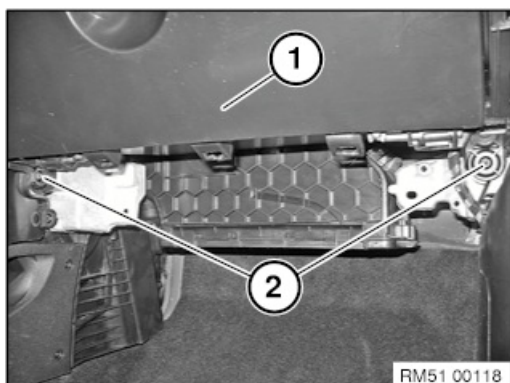
- Remove lower instrument panel trim



Open glove box cover if necessary.
Release screws (1).



Lever out glove box light (1).
Disconnect plug connection (2).



Unfasten screws (2).
Pull out glove box at right with housing (1) and set it down.



51 16 ... Removing and installing the lid on the rear centre console cover

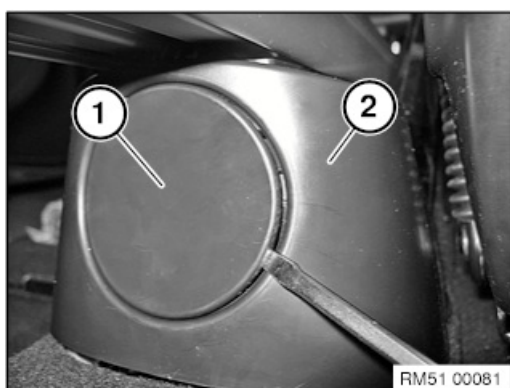


Special tools required:

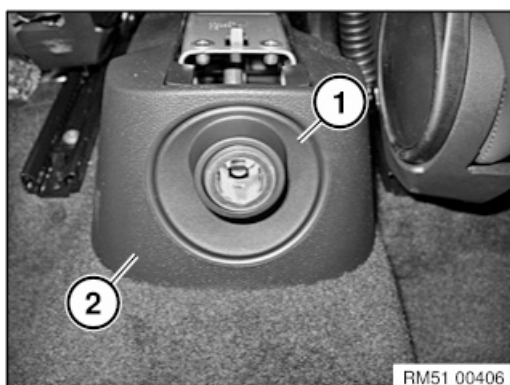
- 64 1 020



When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).

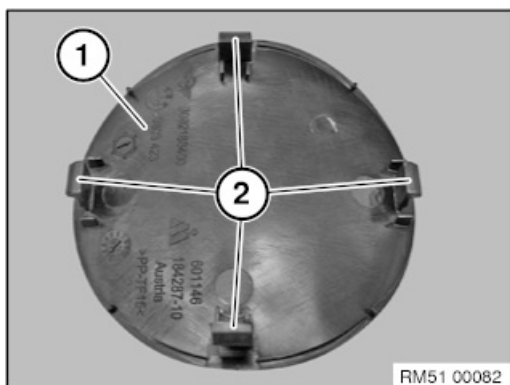


Lever out the lid (1) from the cover of the rear centre console (2) with special tool 64 1 020 .



For versions with a 12 V power socket:

Lever out the lid (1) from the cover of the rear centre console (2) with special tool 64 1 020 .



Installation note:

Retaining tabs (2) of service cap (1) must not be missing or damaged.



**Special tools required:**

- 00 9 325

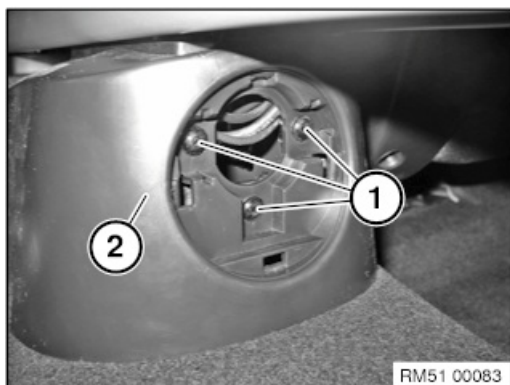


When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).

**Necessary preliminary tasks:**

Only for versions with telephone or short rail:

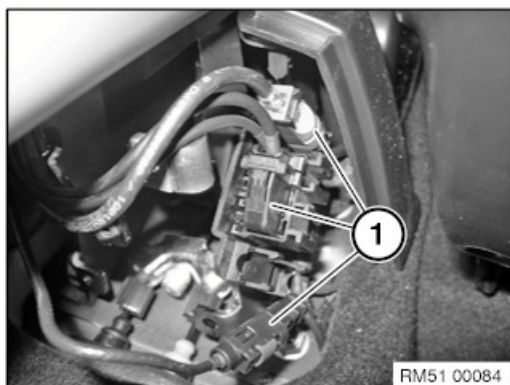
- Remove service cap on centre console cover at rear



Only for versions with telephone or short rail:

Release screws (1) and remove rear centre console cover rearwards (2).

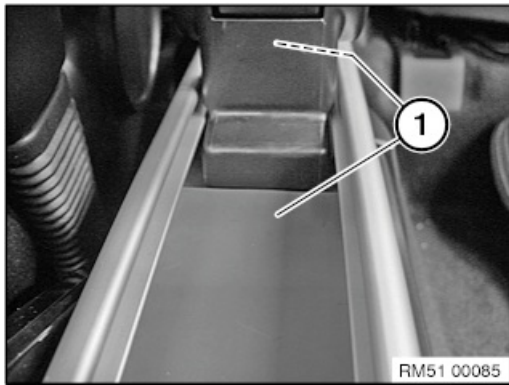
Tightening torque 51 16 6AZ.



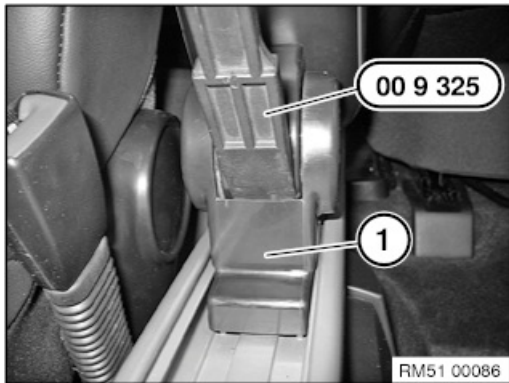
Version with telephone only:

Unlock plug connections (1) and disconnect.



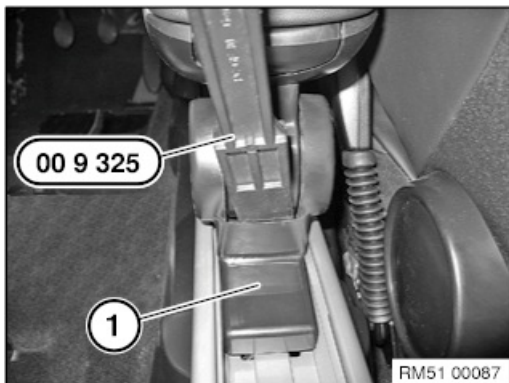


Feed out inserted mat (1) by approx. 5 cm at the front and rear and fold down.



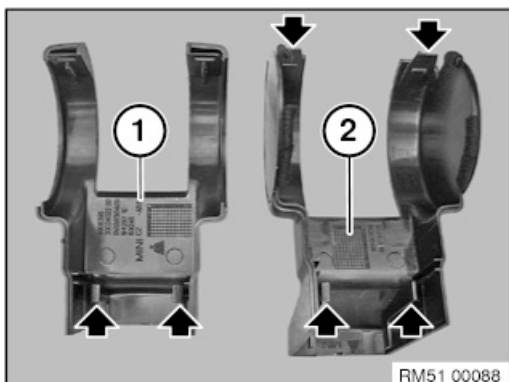
Fold centre armrest up.

Lever out front shell (1) of cover toward front using special tool 00 9 325 .



Fold centre armrest down.

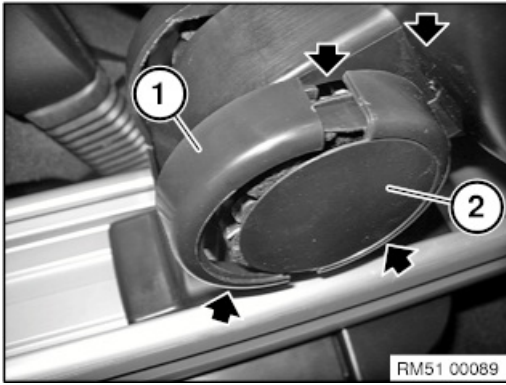
Lever out rear shell (1) of cover toward rear using special tool 00 9 325 .



Installation note:

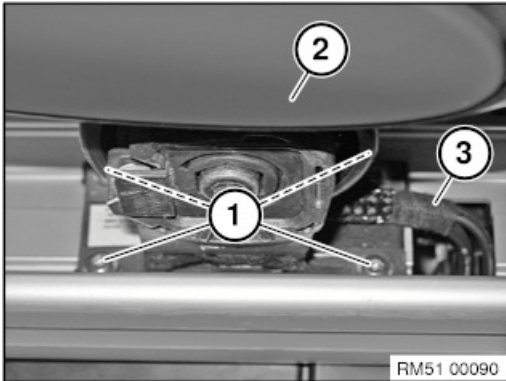
Marked retaining tabs on front (1) and rear (2) shell of cover should not be damaged or missing.





Installation note:

Correctly lock retaining tabs of front (1) and rear (2) shell of cover.



Release screws (1) on centre armrest (2).

Tightening torque 51 16 5AZ.

Installation note:

Replace self-locking screws.

Version with telephone only:

Feed out wiring harness (3).

Replacement

Version with telephone only:

- Modify eject box (base plate)

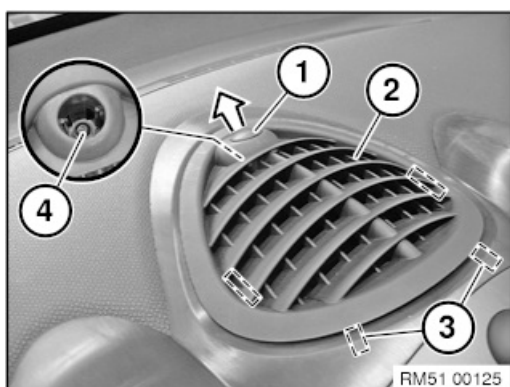


**Special tools required:**

- 00 9 325

**Necessary preliminary tasks:**

- Remove right glove box with housing
- Remove lower instrument panel trim
- Remove cover for instruments

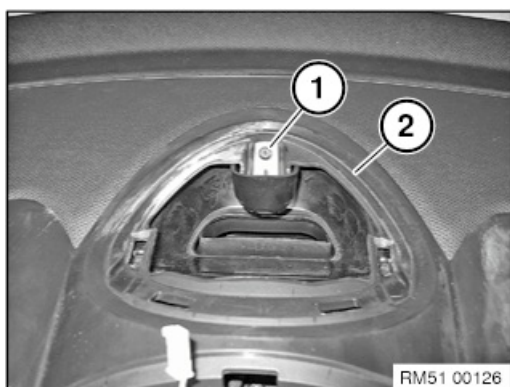


Lever solar sensor cover (1) out of air duct cover at centre (2).

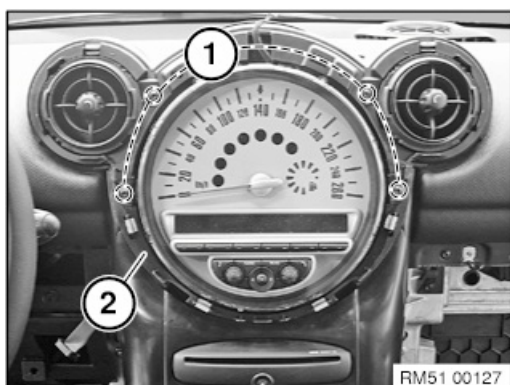
Release screw (4) below.

Raise centre air duct cover at front (2) upward and disengage lateral clamps.

Feed centre air duct cover (2) out of retaining tabs (3) toward the front.

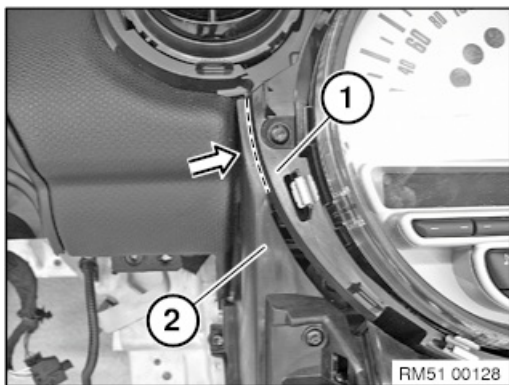


Release screw (1) on instrument panel trim (2).



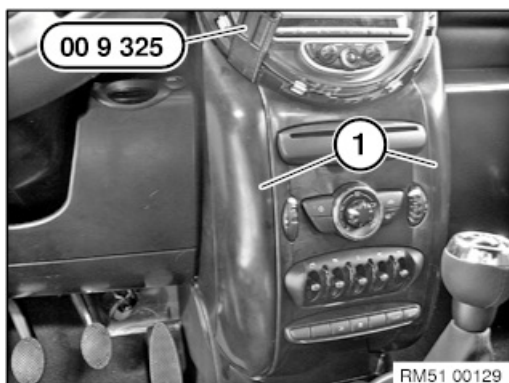
Release screws (1) on instrument panel trim (2).



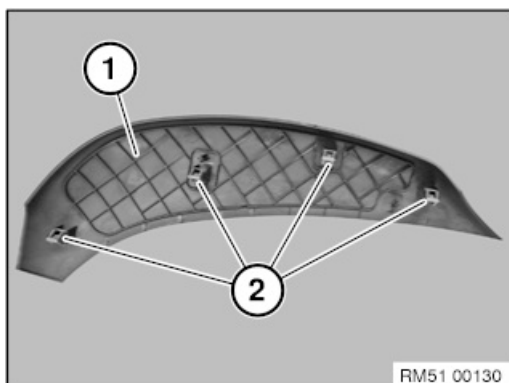


Installation note:

The instrument panel cover (1) is in the marked area above the centre console cover (2).

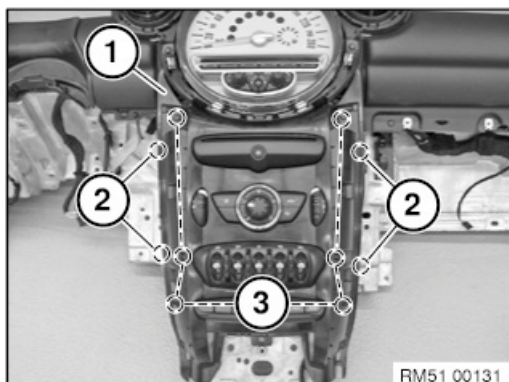


Unclamp the side covers (1) of the centre console toward the side using special tool 00 9 325 .



Installation note:

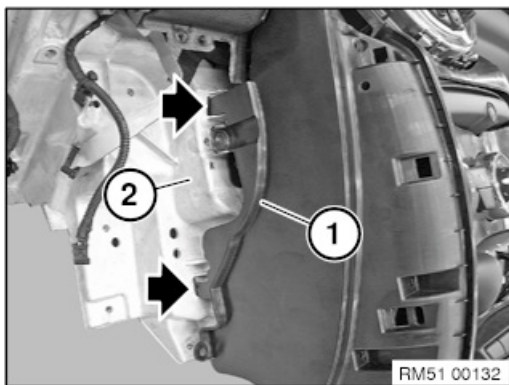
Clamps (1) of side covers (2) on the centre console must not be damaged or missing.



Release screws (2) and (3) from centre console cover (1).

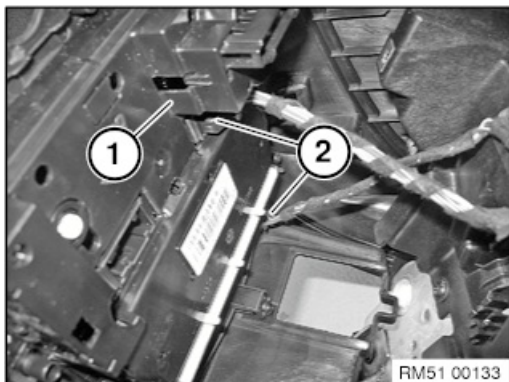
Carefully move centre console cover (1) to the back slightly.





Installation note:

Fit retaining pins of centre console cover (1) correctly in recesses on dashboard support (2).



Carefully move centre console cover (1) to the back slightly.

Unlock plug connections (2) and disconnect.

Completely feed out centre console cover (1).





When working with trim panels, be sure not to scratch or damage visible surfaces (e. g. with sharp-edged tools).



Necessary preliminary tasks:

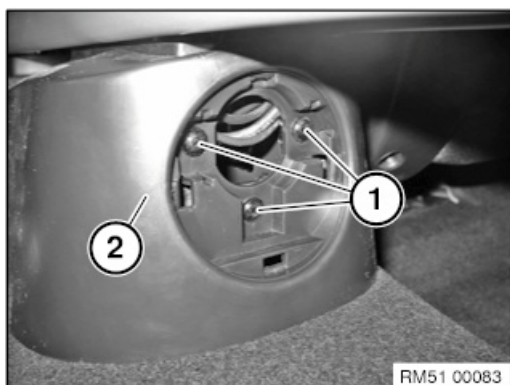
- Remove front cup holder
- Remove the rail

Not for version with telephone:

- Remove the cover from the rear centre console cover

For versions with a 12 V power socket:

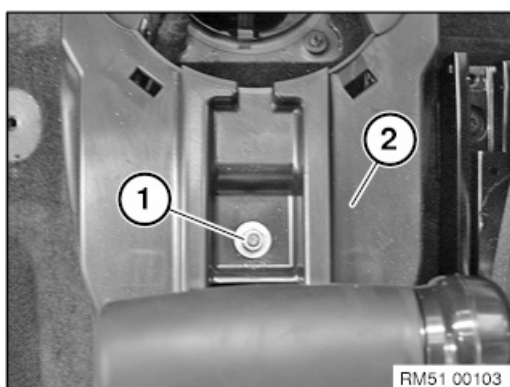
- Remove the 12 V power socket



Not with telephone optional equipment:

Release screws (1) and remove rear centre console cover rearwards (2).

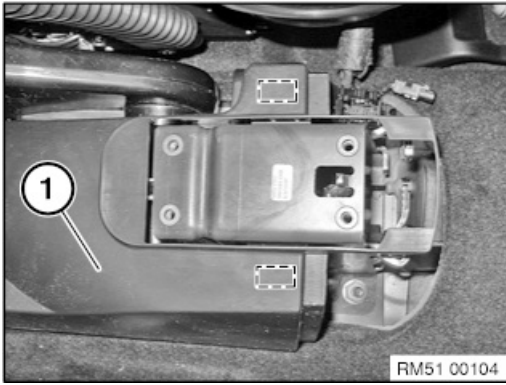
Tightening torque 51 16 6AZ.



Release nut (1) from centre console (2), front.

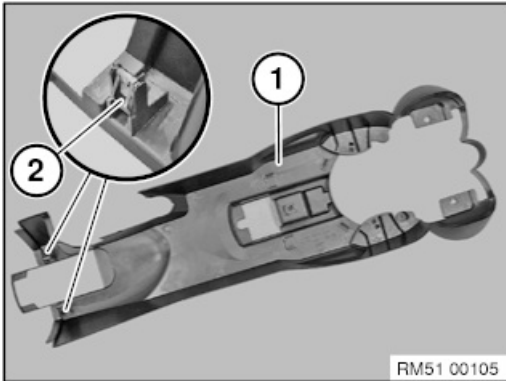
Tightening torque 51 16 7AZ.





Detach centre console (1) at rear right and left.

Feed out centre console (1) past parking brake lever and set down.



Installation note:

Retaining clips (2) of centre console (1) must not be damaged or missing.

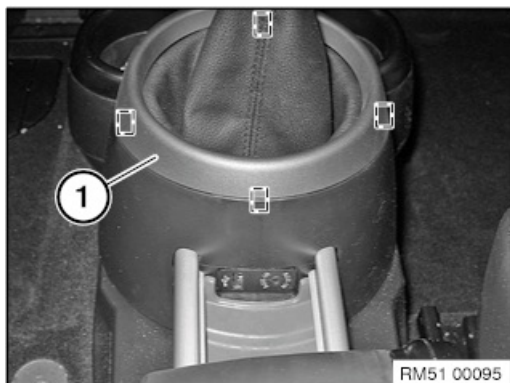
Watch out for the wiring harness installation arrangement.



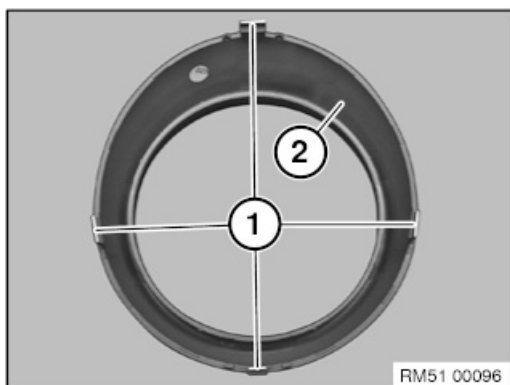
51 16 ... Removing and installing/replacing decorative ring on gearshift lever cover



When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



Unclip frame trim (1) at marked locations and remove.



Installation note:

Retaining tabs (1) of frame trim (2) must not be damaged or missing.





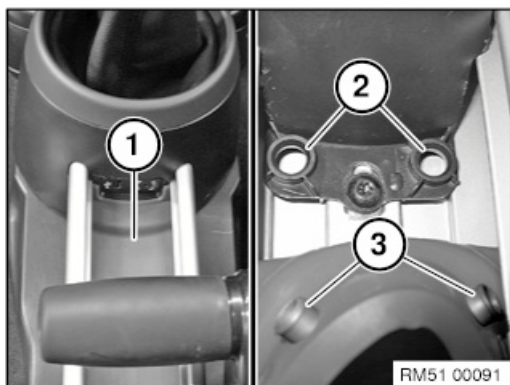
When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



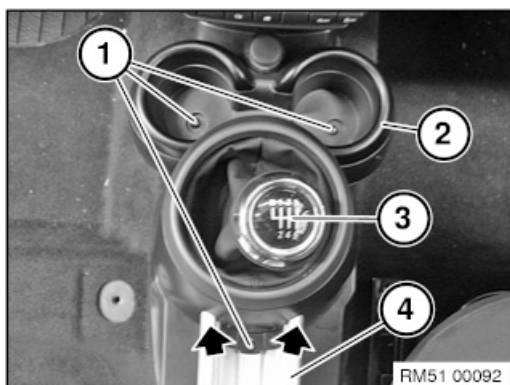
Necessary preliminary work:

Version with automatic transmissions only:

- Remove gaiter (selector lever cover for gearshift bracket).



Fold insert mat at front (1) towards rear. *Installation note:*
Mount nipples (3) correctly in holding eyelets (2).



Release screws (1) on cupholder (2) at front.

Tightening torque 51 16 8AZ.

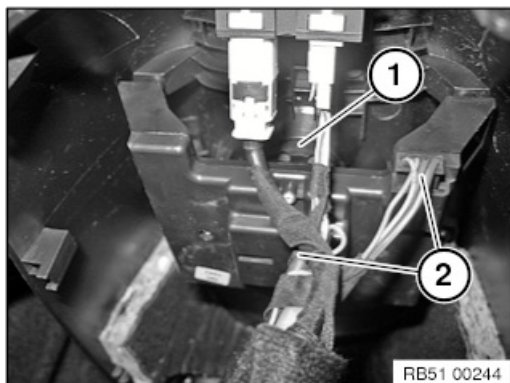
Feed cupholder (2) out of mounting rail (4).

Manual gearbox versions only:

- Pull gearshift lever knob (3) up off of gearshift lever with a jerk.

Installation note:

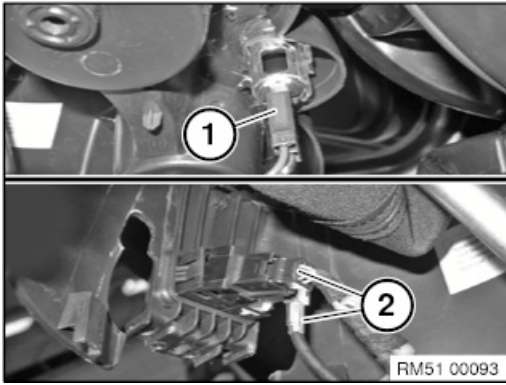
Gearshift lever knob (3) must noticeably engage on gearshift lever.



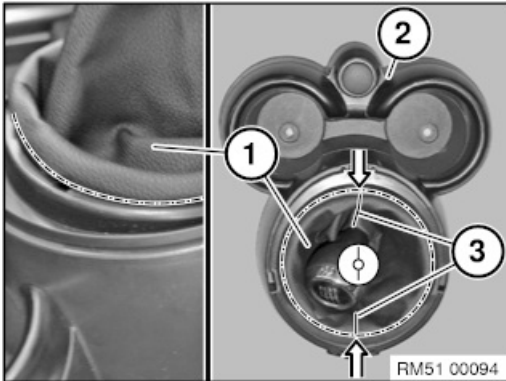
With controller version only:

Unlock plug connections (2) on controller (1) and disconnect.





Disconnect plug connection on cigarette lighter (1).
If necessary, unlock further plug connections (2) and disconnect.
Remove can holder.



Replacement

- Modify cigarette lighter
- If necessary, modify communication interface

With controller version only:

- Modify front controller.

Manual gearbox versions only:

- Carefully feed out gearshift lever cover (1) at marked location.

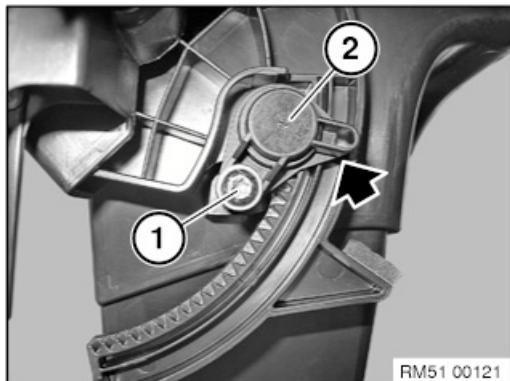
Installation note:

Seams of gearshift lever cover (3) run in a 6-o'clock direction relative to the cupholder at front (2).

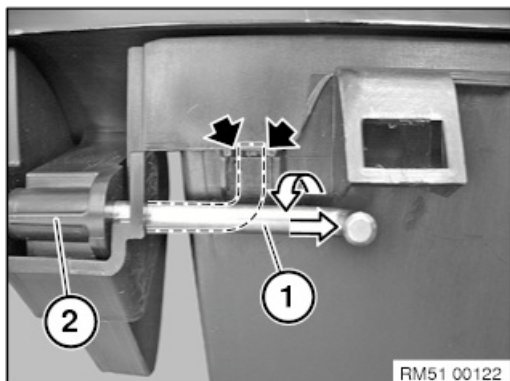


**Necessary preliminary work:**

- Remove right glove box with housing



Release screw (1) from damping element (2). *Installation note:*
Correctly feed sliding pin on damping element (2) back into slide rail of glove box cover.



Unlock the hinge bolt (1) at the stop and remove it by turning it to the point where the hinge bolt (1) can be pulled out of the hinge (2) of the glove box cover.

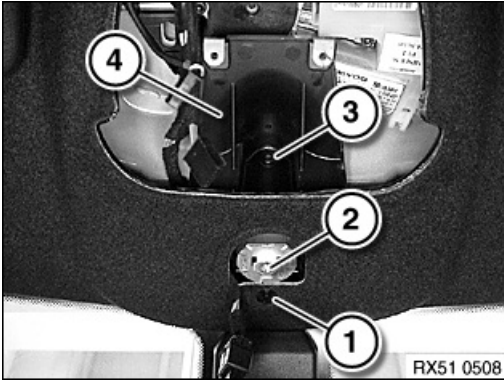
Repeat procedure for second hinge bolt (1).

Installation note:
Correctly lock hinge bolt after installation.



**Necessary preliminary tasks:**

- Remove inside mirror
- Remove roof operating facility



Release clip (1).

Unfasten screws (2 and 3).

If necessary, release cable clip and feed out holder (4).



51 16 041 Removing and installing/replacing protective cap on left or right exterior mirror

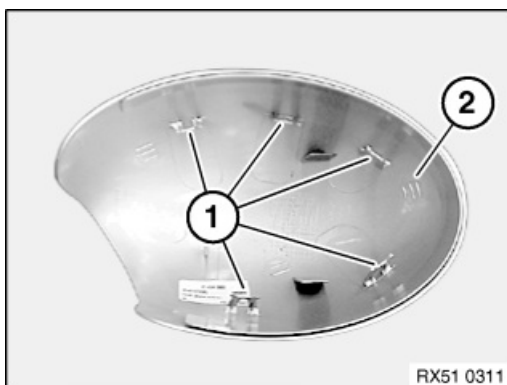


Necessary preliminary work:

- Remove mirror glass



Release latch mechanisms (1) starting at bottom and remove cover.



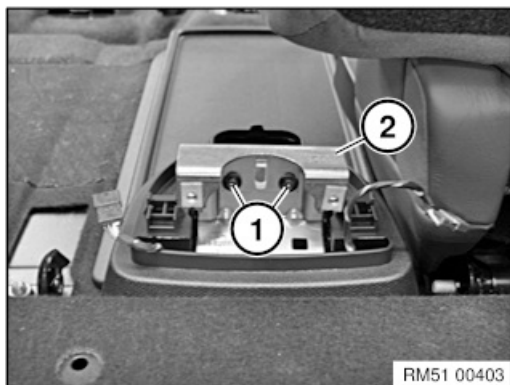
Installation note:

Latch mechanisms (1) on housing (2) must not be damaged.

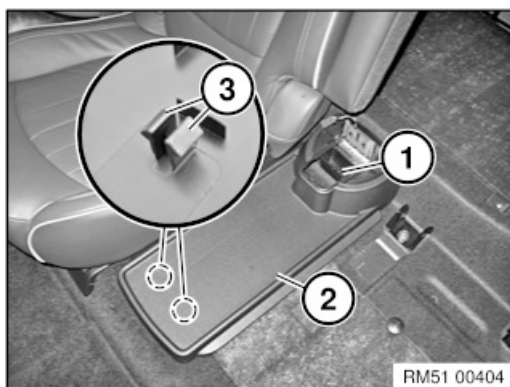


**Necessary preliminary tasks:**

- Remove left rear seat
- Remove rail



Release screws (1) and remove retaining bracket (2).
Tightening torque 51 16 10AZ.

**For version with long rail:**

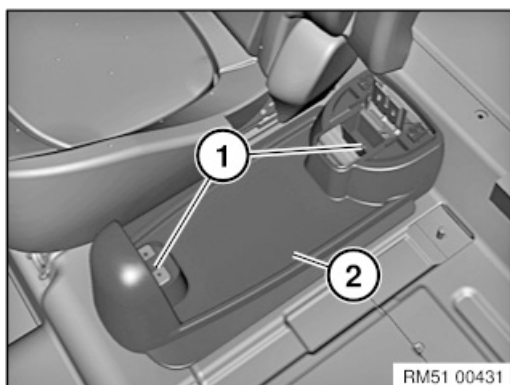
Release screw (1).

Tightening torque 51 16 6AZ.

Unclip the rear centre console (2) out of the latch mechanisms (3) toward the top and remove.

Installation note:

Catches (3) must not be damaged or missing.

**For version with short rail:**

Release screws (1).

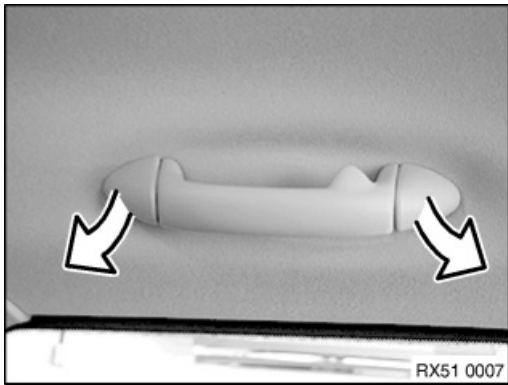
Tightening torque 51 16 6AZ.

Feed out rear centre console (2) to the top/rear.

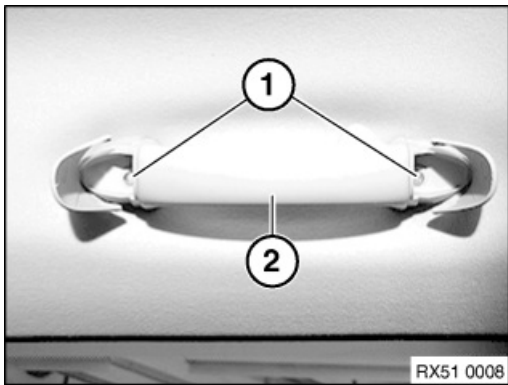


51 16 450

Removing and installing/replacing rear left/right grab handle



Open covers in direction of arrow.

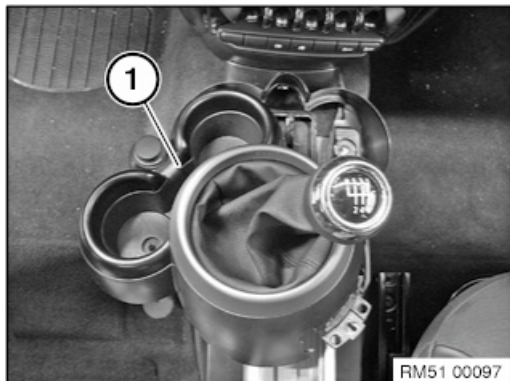


Release screws (1) and remove grab handle (2).

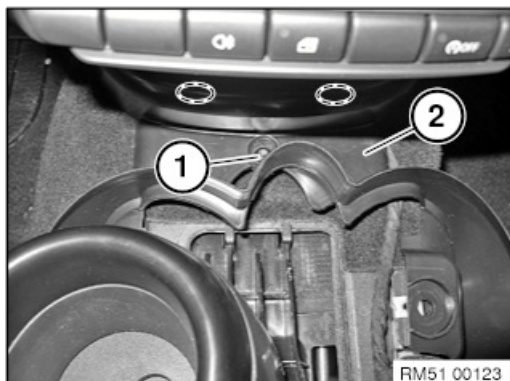




When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



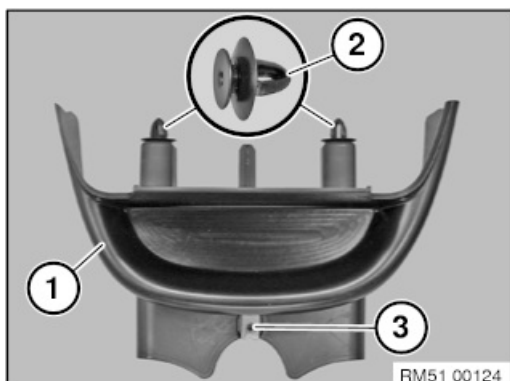
Turn cup holder (1) aside. The required operations are described at:
Removing and installing/replacing front cupholder



Undo screw (1) from storage compartment (2).

Pull storage compartment (2) toward the back slightly, unclipping it at the marked areas.

Feed out storage compartment (2) toward the side.



Installation note:

Clips (2) of storage compartment (1) must not be damaged or missing.



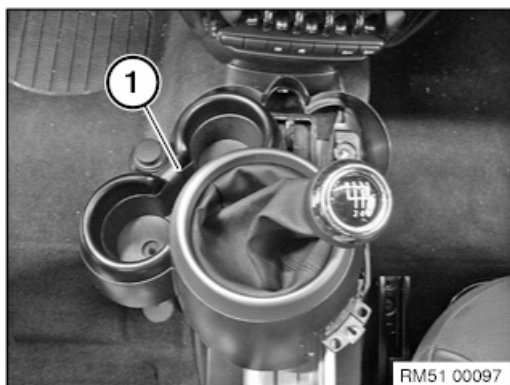


When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).

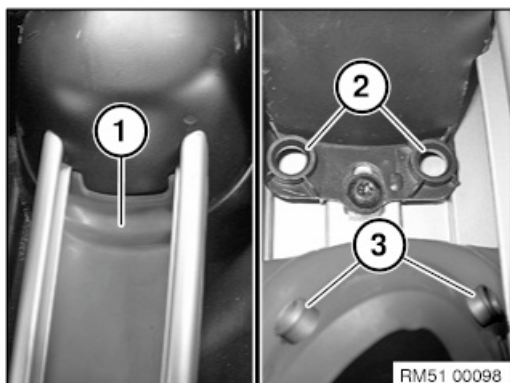


Necessary preliminary tasks:

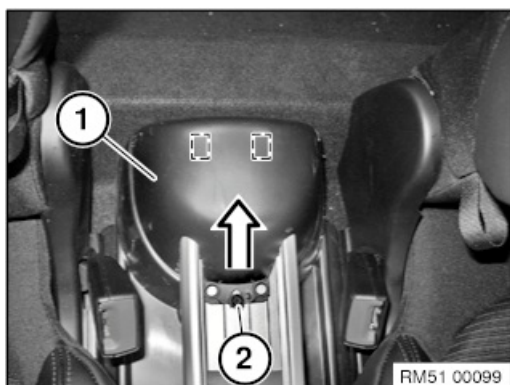
- Remove centre armrest



Turn cup holder (1) aside. The required operations are described at:
Removing and installing/replacing front cup holder



Fold down the rear insert mat (1) towards the front. *Installation note:*
Mount nipples (3) correctly in holding eyelets (2).

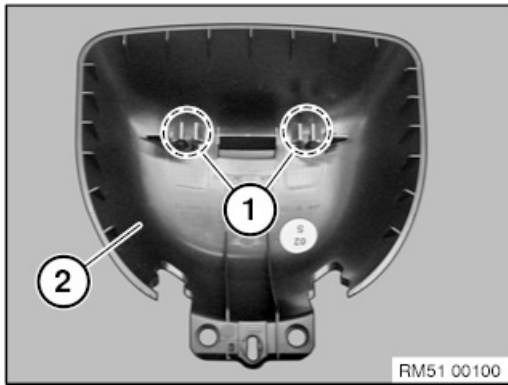


Undo screw (2) on closing cover (1).

Tightening torque 51 16 8 AZ.

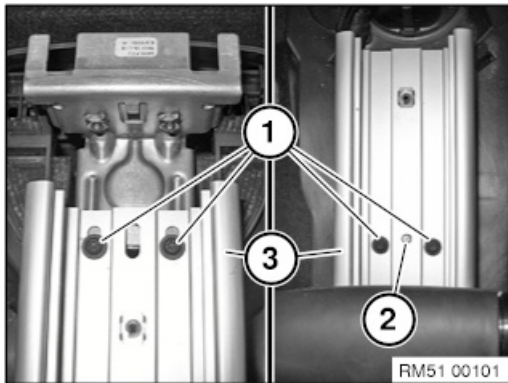
Closing cover (1) can be unclipped and removed by sliding it to the rear.





Installation note:

Retaining tabs (1) on the cover panel (2) must not be damaged or missing.



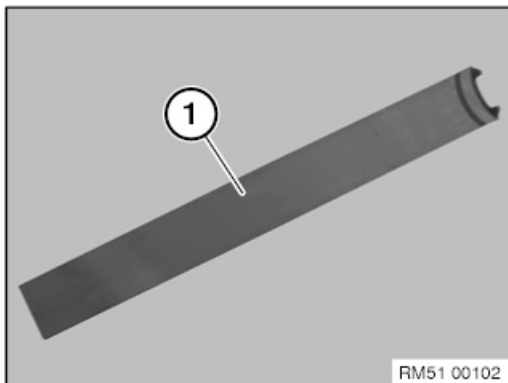
Release rear and front screws (1) from mounting rail (3).

Tightening torque 51 16 9 AZ.

Carefully feed out mounting rail (3) and set down.

Installation note:

Feed mounting rail (3) correctly into locating pin (2).



Replacement:

- Modify front and rear insert mats (1).



**Special tools required:**

- 00 9 317

**Warning!**

Move mirror glass with hand carefully and slowly.

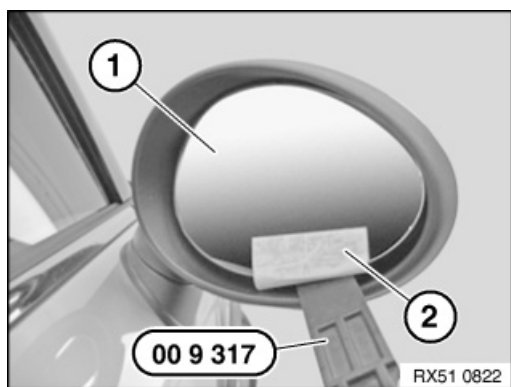
If mirror glass is damaged:

Wear protective goggles and cut-proof gloves.

Danger of injury by flaking-off glass splinters.

**Important!**

Bring exterior mirror to room temperature to prevent catches from breaking off.

*Note:*

Secure mirror glass (1) against falling out.

Mirror heating cables are very short.

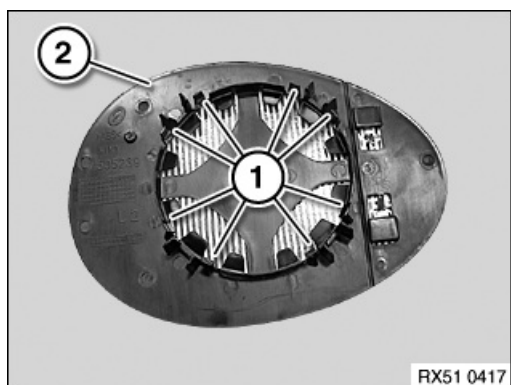
Press mirror glass (1) on side vehicle by hand to full extent.

Affix mirror glass (1) with adhesive tape (2).

Unclip mirror glass (1) all round with special tool 00 9 317 .

If necessary, disconnect related plug connections.

Remove the mirror glass (1).

*Installation note:*

Retaining lugs (1) must not be damaged.

Fit mirror glass (2) with retaining lugs (1) flush on mirror adjusting drive and clip into place.

Ensure correct locking.

Run a function check.





Necessary preliminary tasks:

- Remove servodrive for fuel filler flap
- Remove rear left wheel arch cover
- Remove flap for fuel filler neck

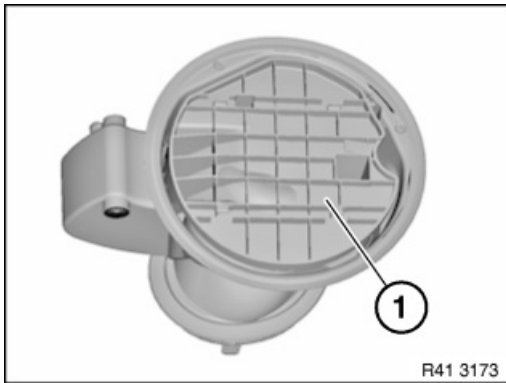
Note:

Carry over schematic diagram to the relevant vehicle type.



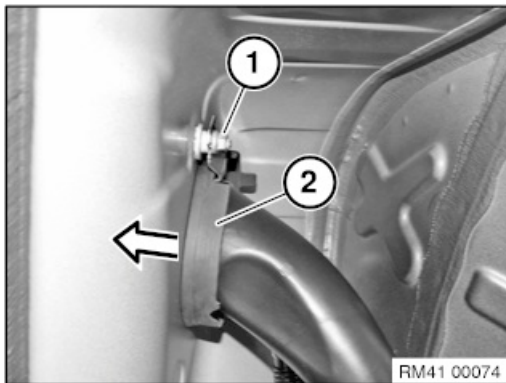
Important!

Deformation of the sheet metal flanges in the side panel and the wheel arch results in permanent vehicle leakage. Carry out removal/installation with great care.



The following body new parts are required (refer to Electronic Parts Catalogue)

- (1) Cover bowl



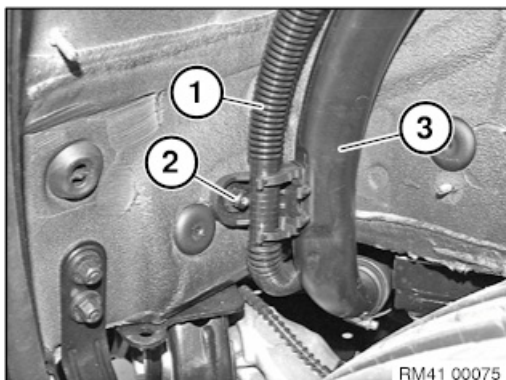
Slacken nut (1).

Tightening torque 16 11 1AZ.

Release rubber seal (2) from the sheet metal flange and press it outward in the direction of the arrow.

Installation note:

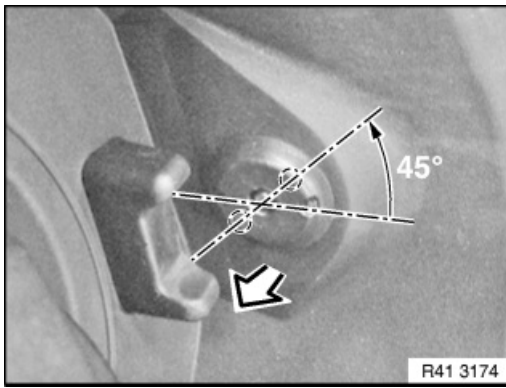
Ensure that the grounding cable is correctly screwed onto the body (1).



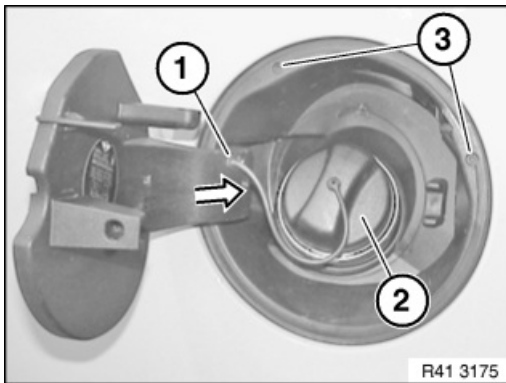
Unclip the ventilation (1).

Release nut (2) and fuel filler pipe (3) slightly.

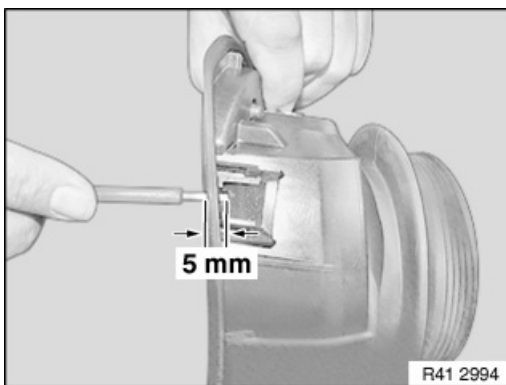




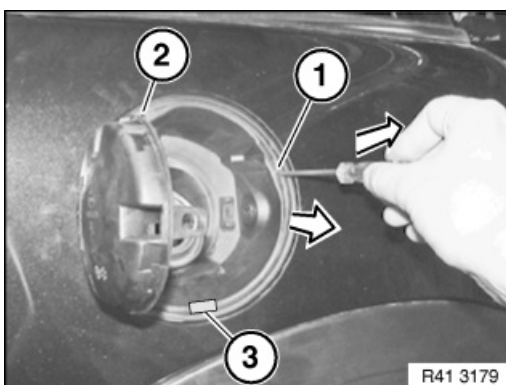
Turn sleeve through approx. 45° and pull out in direction of arrow.



Press retaining strap (1) inwards in direction of arrow and remove.
Remove cover (2).
Pierce cover bowl at markings (3) with a small screwdriver.



Insert screwdriver to a depth of max. 5 mm and unlock cover bowl latch mechanism.

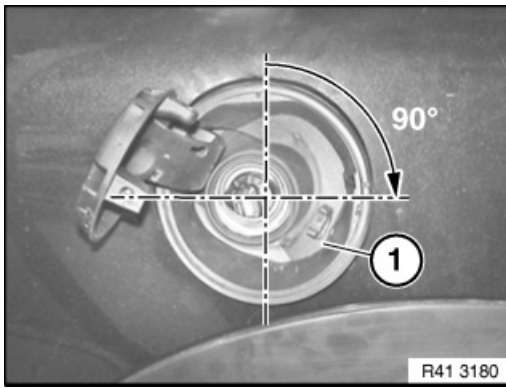


Unlock latch mechanisms (1) and (2) in succession.
Lever out cover bowl in area (3) with plastic wedge.

Important!

Do not damage sheet metal flange of side wall.

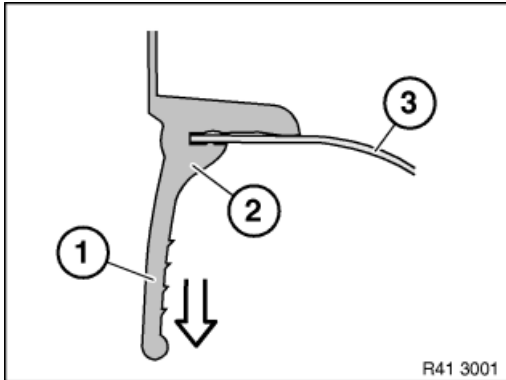




Carefully turn cover bowl (1) in direction of arrow and remove. *Installation note:*

Open hinge arm.

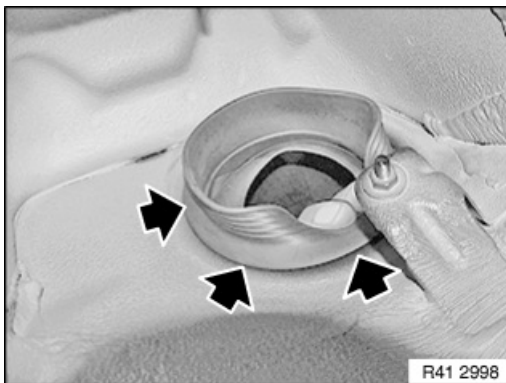
Insert cover bowl and engage sealing sleeve over fuel filler pipe.



Installation note:

Sealing lip (2) has a shaped extension that serves as a fitting aid (1).

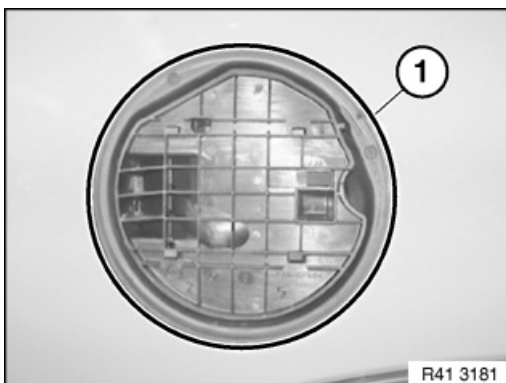
Using fitting aid (1), pull sealing lip (2) over sheet metal flange of wheel arch (3).



Installation note:

Illustrations shows fuel filler pipe removed.

Check that sealing lip is correctly seated.



Installation note:

Cover bowl must snap into place 3 times.

After installing, carefully check that cover bowl is securely seated.

There must be no discernible gap between sealing lip and side wall in area (1).



51 21 004

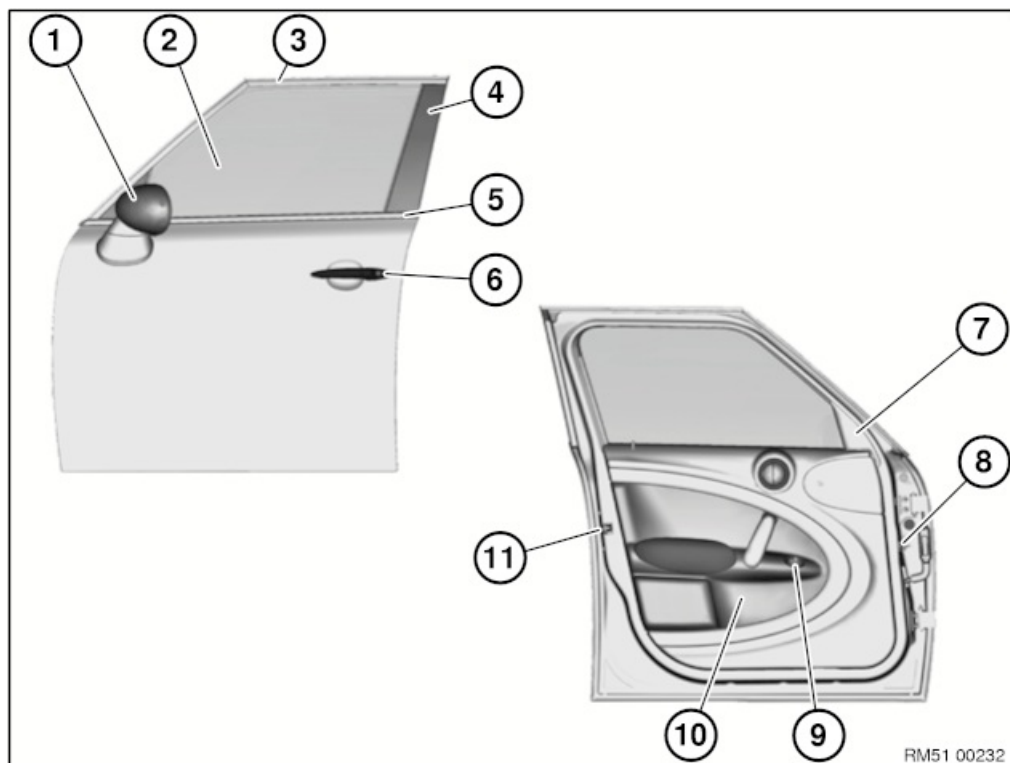
Adjusting front left or right lock striker



Operation is described in:
Adjusting left or right front doors.



51 00 .. Overview of front door



- | | |
|--------------------------------------|--|
| 1 Exterior mirror | 7 Cover on window frame (see rubber window seal for door window) |
| 2 Door window glass | 8 Door brake |
| 3 Rubber guide for door window glass | 9 Switch for exterior mirror/power window regulator |
| 4 Trim on window frame | 10 Door trim panel |
| 5 Window cavity cover strip | 11 Door lock |
| 6 Outer door handle | |

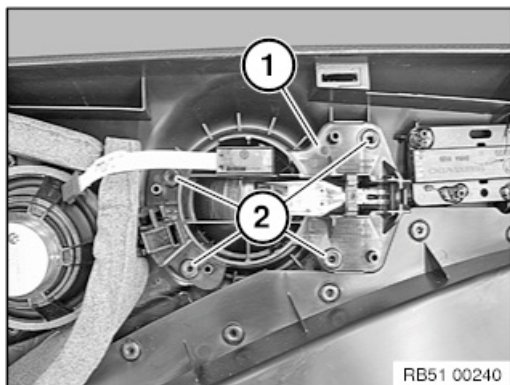


51 21 225 Removing and installing or replacing inside door opener in left or right front door



Necessary preliminary tasks:

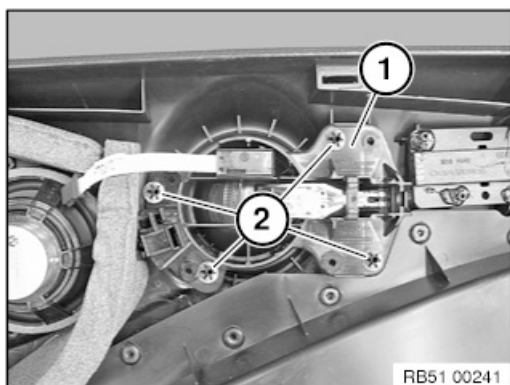
- Remove door opener cover (inside)
- Remove Bowden cable for inside door opener.



With welded fastening version only (original):

Drill out plastic welds (2).

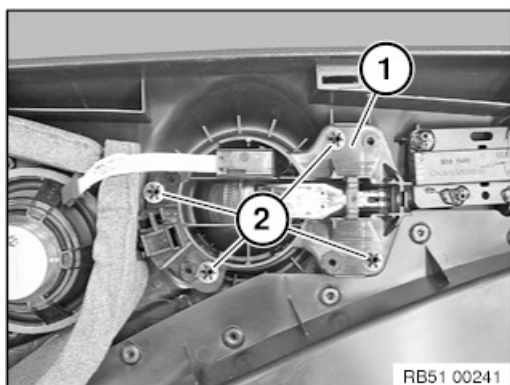
Lever out and remove inside door opener (1).



With clamped fastening version only (repair solution):

Lever out axial locks (2).

Remove inside door opener (1).



Installation note:

Secure inside door opener (1) with repair solution axial locks (2).

Existing axial locks (2) can be reused if they are not damaged.

Replacement

For version with light package only:

- Modify LED for inside door handle



51 21 170 Removing and installing or replacing outer door handle from left or right front door

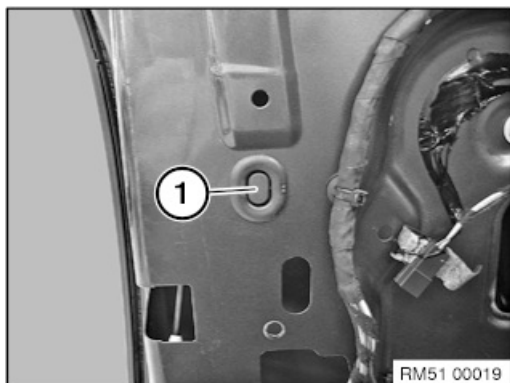


Necessary preliminary tasks:

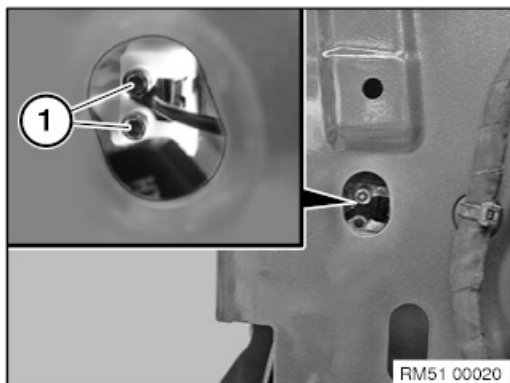
- Remove door lock of front door

R61 only:

- Fix door window glass in closed position

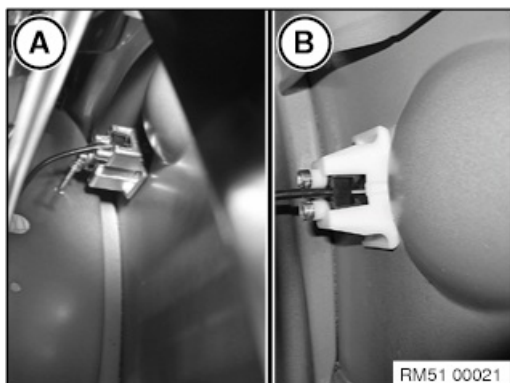


Lever out seal plugs (1).



Release screws (1) from lock barrel housing or retaining element (see also next operation).

Tightening torque 51 21 1AZ.

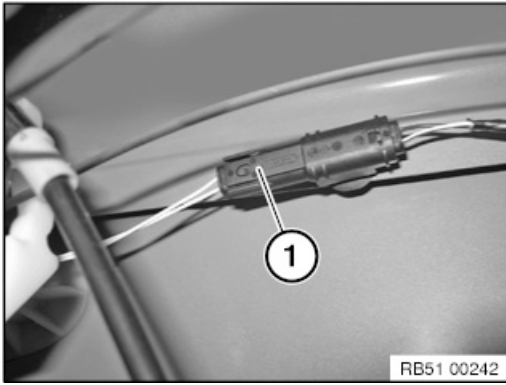


Note:
Version

A = Driver's side with lock barrel housing

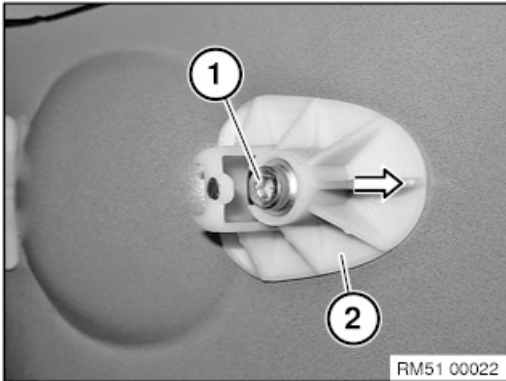
B = Passenger's side with retaining element





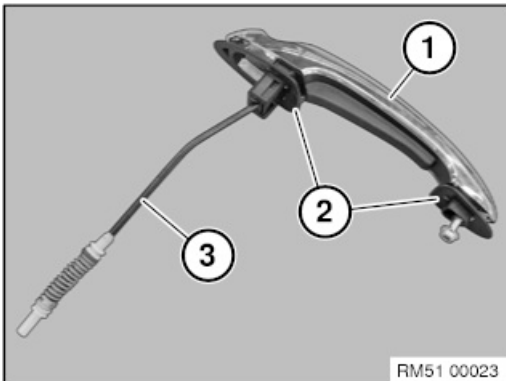
Version with Comfort Access:

Unfasten plug connection (1) and disconnect.



Slacken front bolt (1) on outer door handle until the retaining element (2) can be removed from the front.

Tightening torque 51 21 1AZ.



Note:

Shown removed here for purposes of clarity.

Feed outer door handle (1) with Bowden cable (3) out of the door. *Installation note:*

Rubber seals (2) of outer door handle (1) must not be missing or damaged.



51 21 300 Removing and installing or replacing window cavity cover strip on outside of left or right front door



Special tools required:

- 00 9 324



Important!

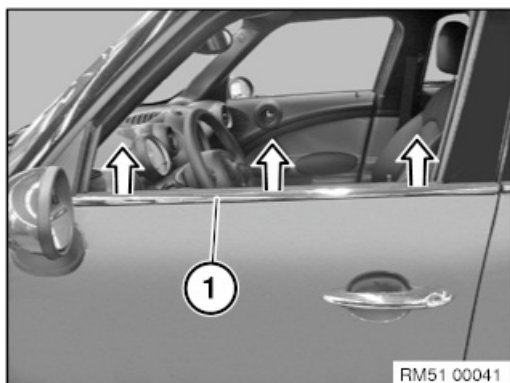
Observe procedure for using special tool 00 9 324 .

The "Instructions on fitting window guide seals" serve as the basis for this repair instruction and must be observed without fail.



Necessary preliminary tasks:

- Completely open side window if necessary



Important!

If reusing the existing window cavity cover strip (1), make sure it is not bent.

Lever out weather strip (1) with special tool 00 9 324 (starting at B-pillar). *Installation note:*
Coat weather strip (1) prior to fitting with approved lubricant.





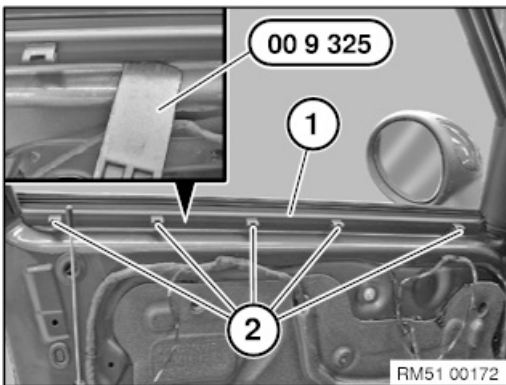
Special tools required:

- 00 9 325



Necessary preliminary tasks:

- Remove front door trim panel



Carefully lever out and remove weather strip (1) with special tool 00 9 325 towards top. *Installation note:* Retaining clips (2) must not be damaged or missing.

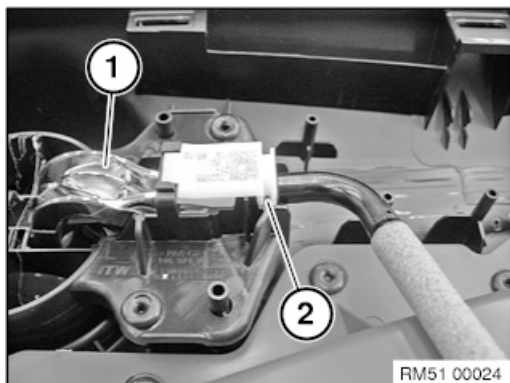


51 21 235 Removing and installing/replacing Bowden cable for inside door opener on left or right front door

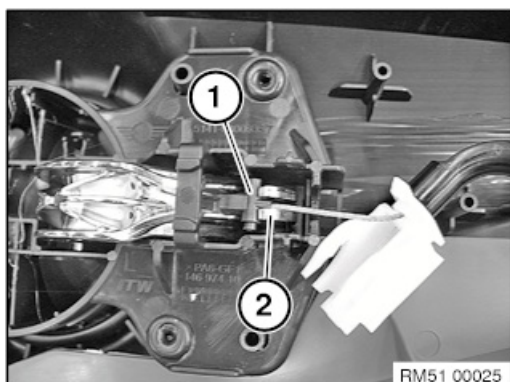


Necessary preliminary tasks:

- Remove door trim panel of front door



Feed Bowden cable sleeve (2) out of inside door handle lock (1).



Installation note:

Insert Bowden cable nipple (1) correctly into mounting (2) of inside door handle.





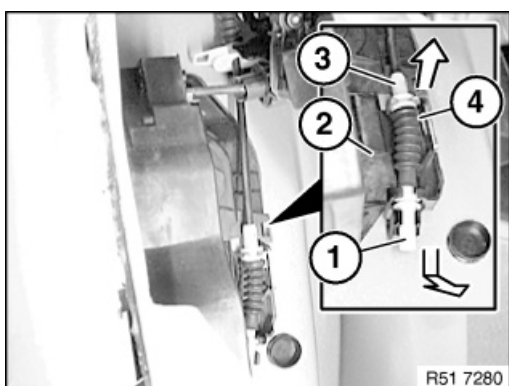
Special tools required:

- 51 2 190



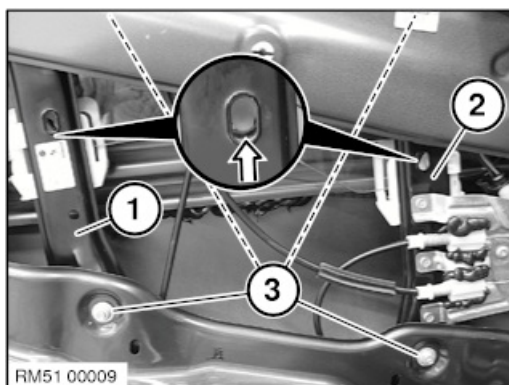
Necessary preliminary tasks:

- Completely close side window if necessary
- Partially remove sound insulation (in area of door lock/rear guide rail, power window regulator)



Disconnect Bowden cable at bottom (1) and then from top (3) at door lock (2). *Installation note:*

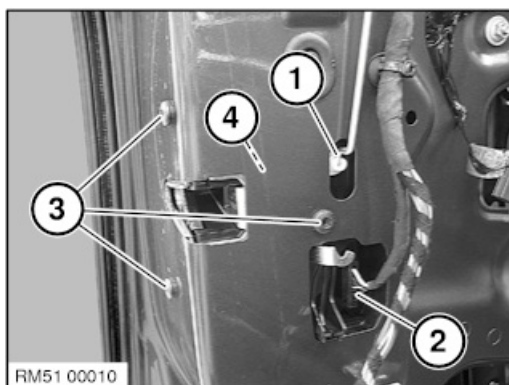
Bowden cable must be correctly engaged in fixture at bottom (1) and top (3) of door lock (2).



Loosen nuts at rear guide rail (1) of power window, release the lower nut (3).

Tightening torque 51 33 1AZ.

Feed out rear guide rail (1) toward the bottom so that the guide rail can swing toward the door middle.



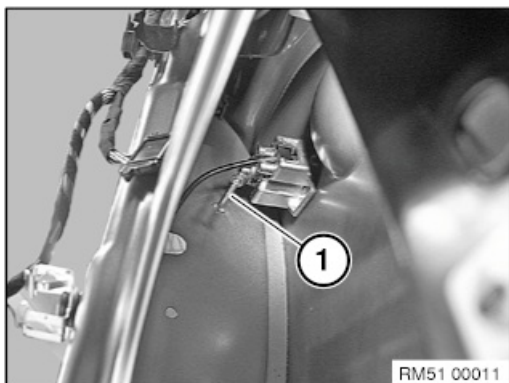
Unclip locking rod (1).

Disconnect plug connection (2) on door lock.

Release screws (3) on door lock.

Feed out the door lock (4) between the inner door panel and rear guide rail.

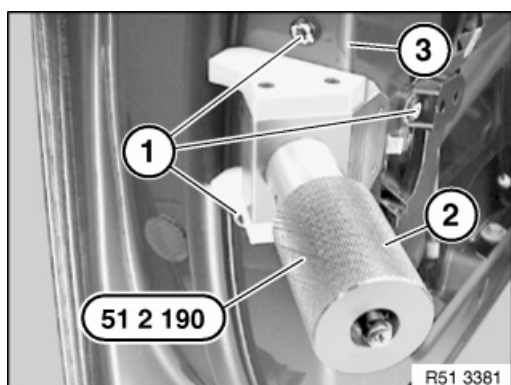




Installation note:

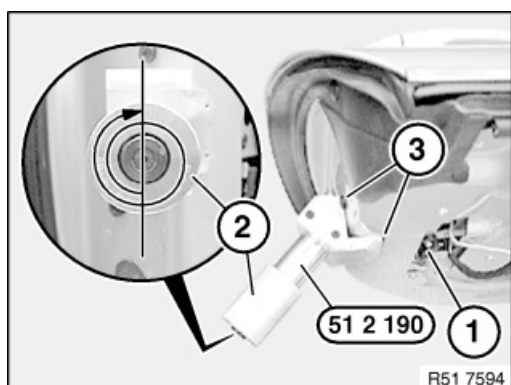
Only for door with lock barrel:

- Feed in paddle (1) of lock barrel correctly back into the door lock.



Installation note:

- Install door lock and insert screws (1), do not tighten down.
- Slide special tool 51 2 190 into opened rotary striker until striker engages in first stage



Installation note:

- Pre-tension door lock (1) with knurled screw (2) until special tool 51 2 190 just contacts corner points (3)

Important!

To tension door lock (1), it is only permitted to tighten knurled screw (2) by a further 1 to 1.5 turns (max.) (risk of damage).

Door lock seal must rest uniformly on inner door panel (water ingress).

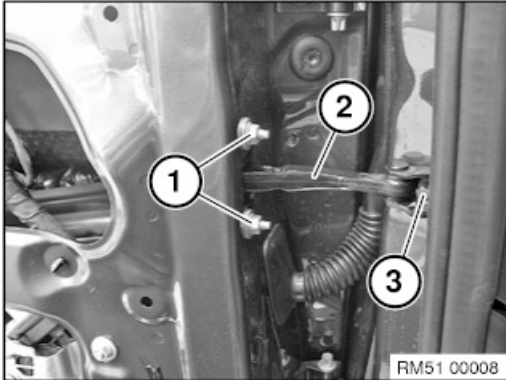
- Tighten screws of door lock
Observe tightening sequence: bottom - top - inner.
Tightening torque 51 21 4AZ.





Necessary preliminary work:

- Remove sound insulation in the area of the door stop
- Completely close side window if necessary



Important!

After disengaging door stop, use suitable means of preventing door from opening past its maximum permissible opening angle (risk of damaging paintwork or bodywork).

Release screw (3).

Tightening torque 51 21 6AZ.

Unscrew nuts (1).

Tightening torque 51 21 7AZ.

Feed out door stop (1) via door aperture and set down.





Operation is described in:

Removing and installing/replacing outer door handle on left or right front door.

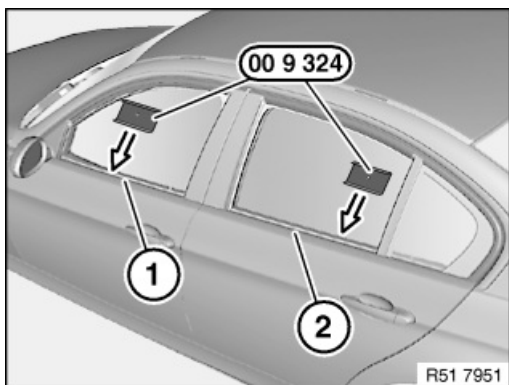


51 21 ... Removing weather strip with special tool 00 9 324 at front or rear



Special tools required:

- 00 9 318
- 00 9 324



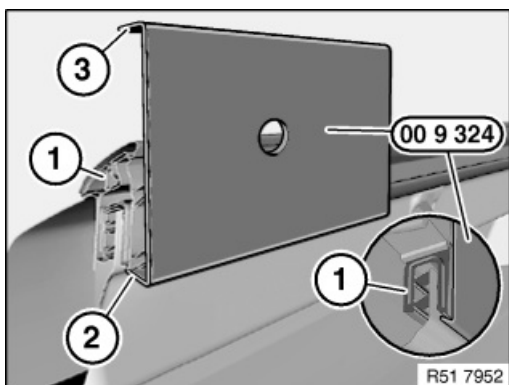
Open side window completely.

Front door:

Insert special tool 00 9 324 at front (at A-pillar) in window cavity (1) (TOP label pointing upwards).

Rear door:

Insert special tool 00 9 324 at rear (at C-pillar) in window cavity (2) (TOP label pointing upwards).

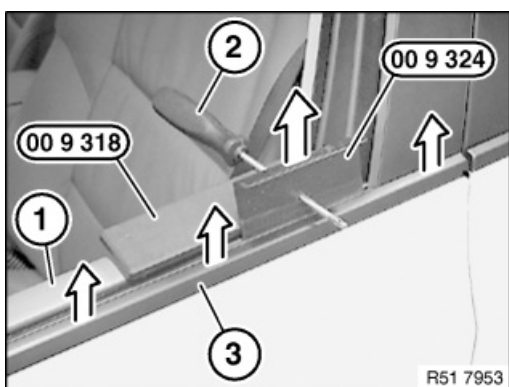


Note:

For purposes of clarity, graphic shows inner door panel and side window removed.

Special tool 00 9 324 must be correctly guided under window cavity cover strip (1).

- 2 Short leg, bottom
- 3 Long leg, top (TOP)



Note:

Start at the front or rear, depending on the model.

Important!

Risk of damage!

Raise weather strip (3) no more than 5 mm in each levering operation, otherwise the strip will be bent.

Position special tool 00 9 318 on door trim panel (1).

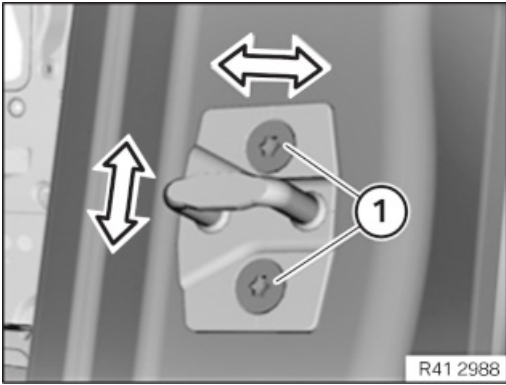
Slide screwdriver (2) via the special tool 00 9 324 and lever window cavity cover strip (3) upwards no more than 5 mm.

Guide special tools 00 9 324 and 00 9 318 towards front/rear and lever out the window cavity cover strip (3).



51 21 003

Replacing door detent (lock striker), front left or right



Release screws (1).

Remove lock striker.

Tightening torque 51 21 8AZ.



Concluding tasks

- Adjust lock striker

This operation is described in: Adjust doors.



51 22 004

Adjusting rear left or right door lock striker

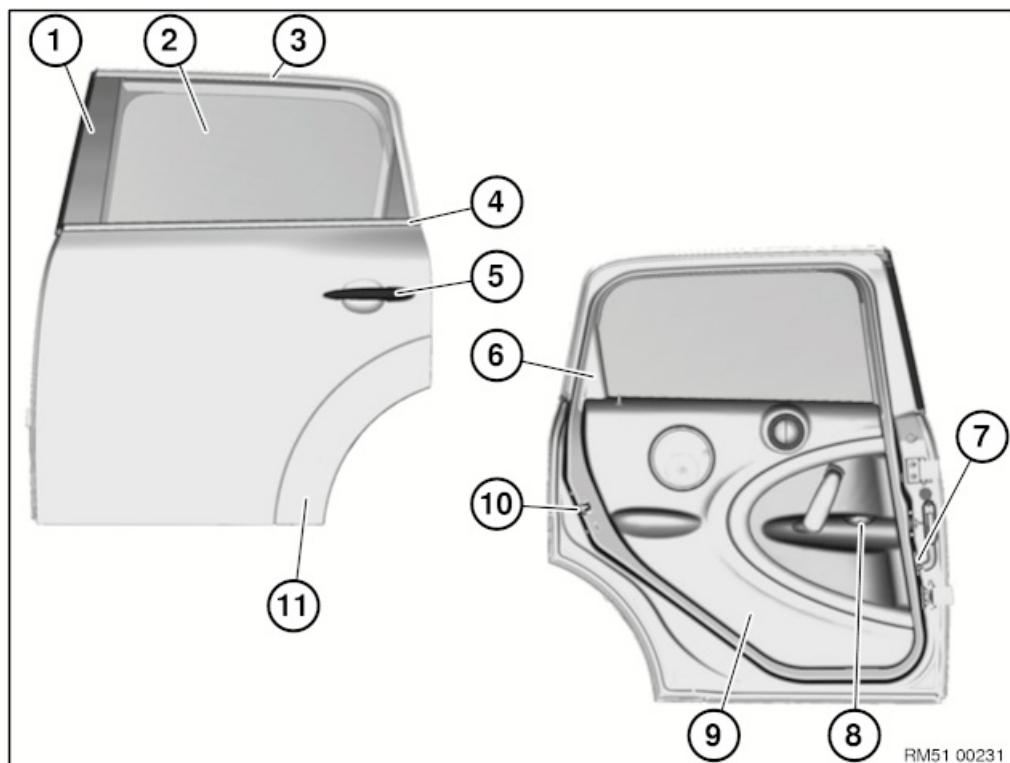


Operation is described in:

Adjust doors.



51 00 .. Overview of rear door



- | | |
|--|--------------------------------------|
| 1 Trim on window frame | 7 Door brake |
| 2 Door window glass | 8 Rocker switch for window operation |
| 3 Rubber guide for door window glass | 9 Door trim panel |
| 4 Window cavity cover strip | 10 Door lock |
| 5 Outside handle | 11 Wheel arch cover |
| 6 Window frame cover (refer to rubber window seal for door window) | |

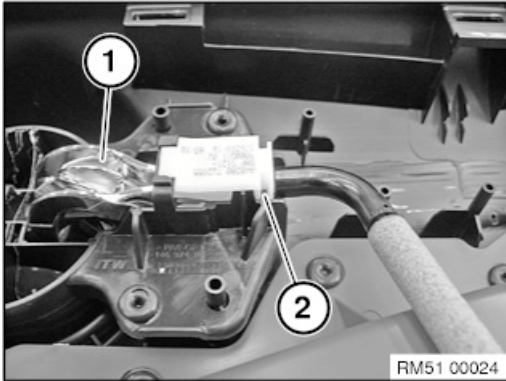


51 22 235 Removing and installing/replacing Bowden cable for inside door opener on left or right rear door

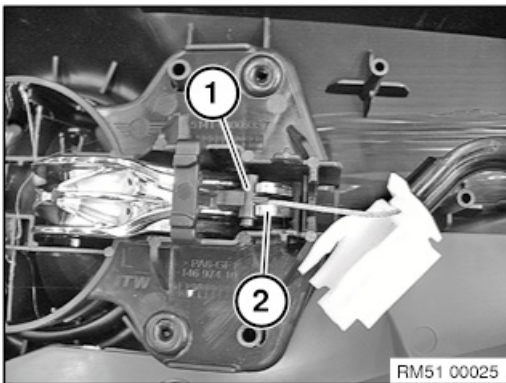


Necessary preliminary work:

- Remove door trim panel from rear door



Feed Bowden cable sleeve (2) out of inside door handle lock (1).



Installation note:

Insert Bowden cable nipple (1) correctly into mounting (2) of inside door handle.





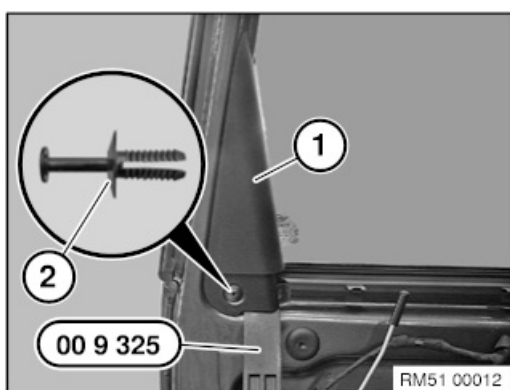
Special tools required:

- 00 9 325
- 51 2 190



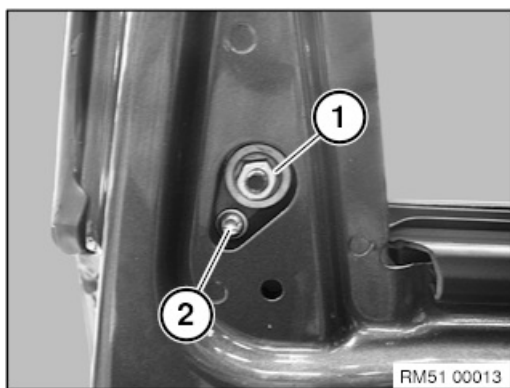
Necessary preliminary tasks:

- Completely close side window if necessary
- Partially remove sound insulation (in area of door lock)



Open expanding rivet (2) and lever out of cover (1) using special tool 00 9 325 .

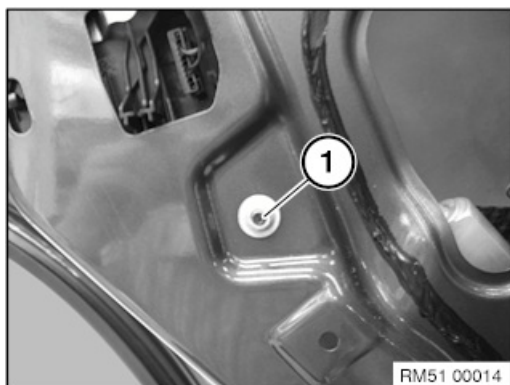
Feed out cover (1) and place to one side.



Remove adhesive tape.

Release nut (1) of guide rail.

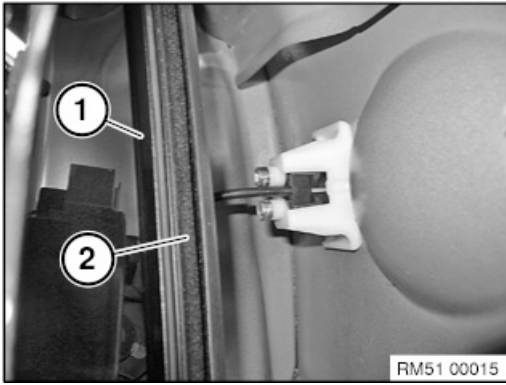
Tightening torque 51 35 3AZ.



Release lower nut (1) of guide rail.

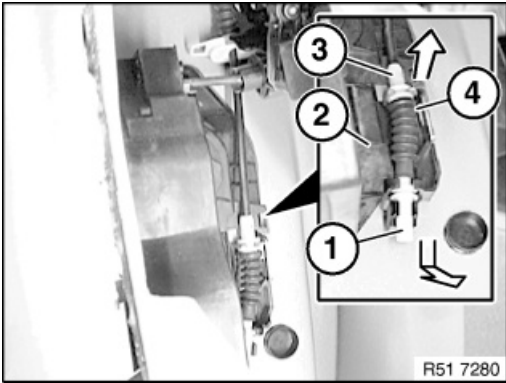
Tightening torque 51 35 3AZ.





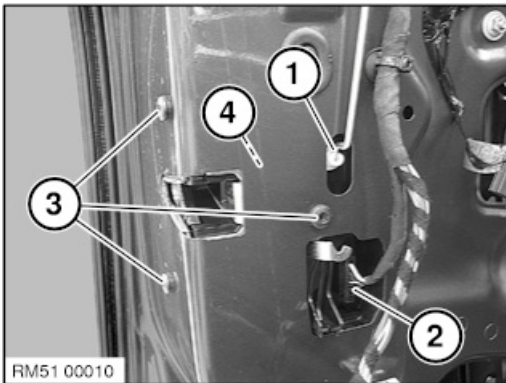
Feed rubber window seal (2) out of guide rail (1).

Feed guide rail (1) out of inner door panel and place to one side.



Disconnect Bowden cable at bottom (1) and then from top (3) at door lock (2). *Installation note:*

Bowden cable must be correctly engaged in fixture at bottom (1) and top (3) of door lock (2).

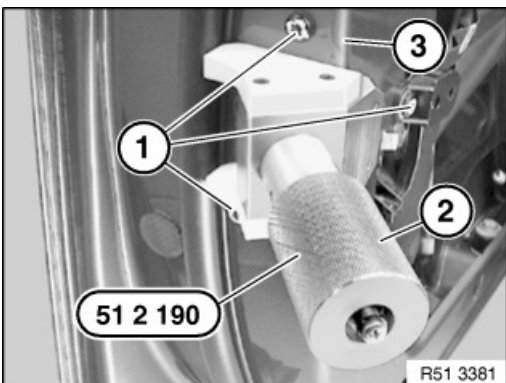


Unclip locking rod (1).

Disconnect plug connection (2) on door lock.

Release screws (3) on door lock.

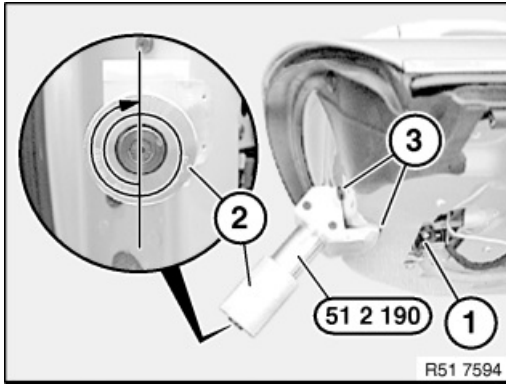
Feed out door lock (4).



Installation note:

- Install door lock and insert screws (1), do not tighten down.
- Slide special tool 51 2 190 into opened rotary striker until striker engages in first stage





Installation note:

Pre-tension door lock (1) with knurled screw (2) until special tool 51 2 190 just contacts corner points (3)

Important!

To tension door lock (1), it is only permitted to tighten knurled screw (2) by a further 1 to 1.5 turns (max.) (risk of damage).

Door lock seal must rest uniformly on inner door panel (water ingress).

Tighten screws of door lock

Observe tightening sequence: bottom - top - inner.

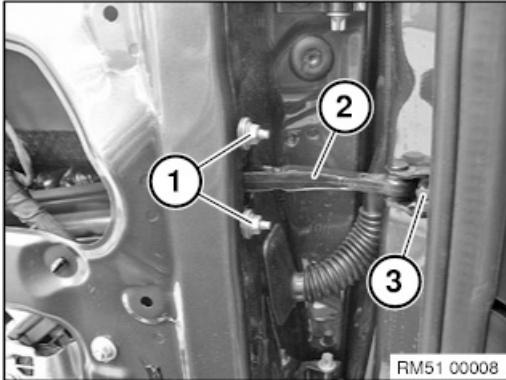
Tightening torque 51 22 3AZ.





Necessary preliminary work:

- Remove sound insulation in the area of the door stop
- Completely close side window if necessary



Important!

After disengaging door stop, use suitable means of preventing door from opening past its maximum permissible opening angle (risk of damaging paintwork or bodywork).

Release screw (3).

Tightening torque 51 22 4AZ.

Unscrew nuts (1).

Tightening torque 51 22 5AZ.

Feed out door stop (1) via door cut-out and place to one side.

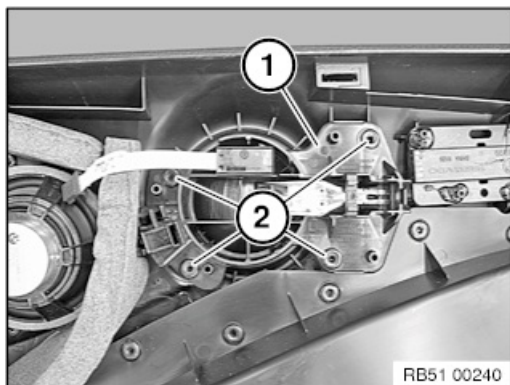


51 22 225 Removing and installing/replacing inside door opener of rear left or right door



Necessary preliminary tasks:

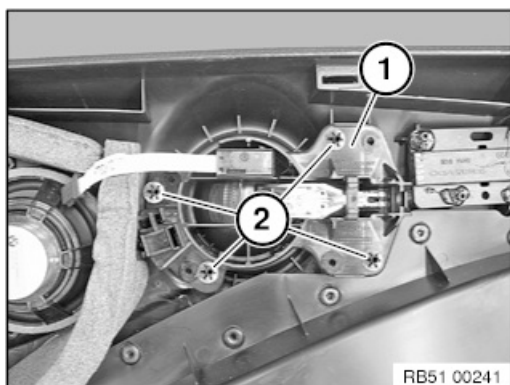
- Remove door opener cover (inside)
- Remove Bowden cable for inside door opener.



With welded fastening version only (original):

Drill out plastic welds (2).

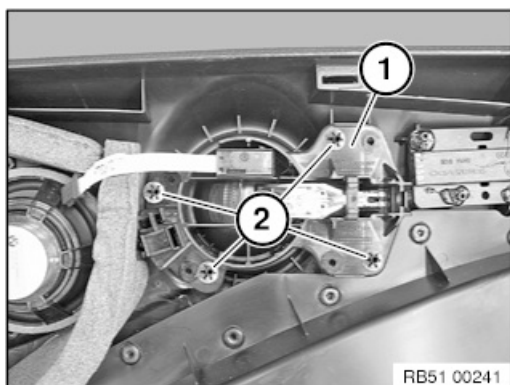
Lever out and remove inside door opener (1).



With clamped fastening version only (repair solution):

Lever out axial locks (2).

Remove inside door opener (1).



Installation note:

Secure inside door opener (1) with repair solution axial locks (2).

Existing axial locks (2) can be reused if they are not damaged.

Replacement

For version with light package only:

- Remount LED for inside door handle

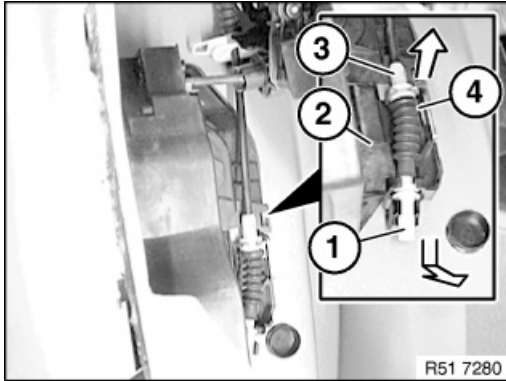


51 22 170 Removing and installing/replacing outer door handle on left or right rear door



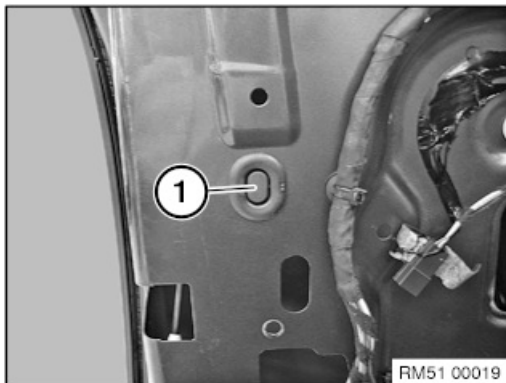
Necessary preliminary tasks:

- Completely close side window if necessary
- Partially remove sound insulation (in area of door lock)

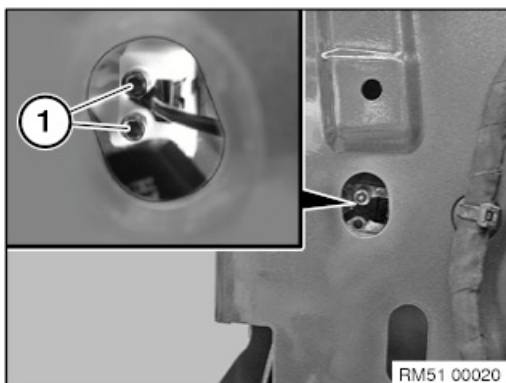


Disconnect Bowden cable at bottom (1) and then from top (3) at door lock (2). *Installation note:*

Bowden cable must be correctly engaged in fixture at bottom (1) and top (3) of door lock (2).



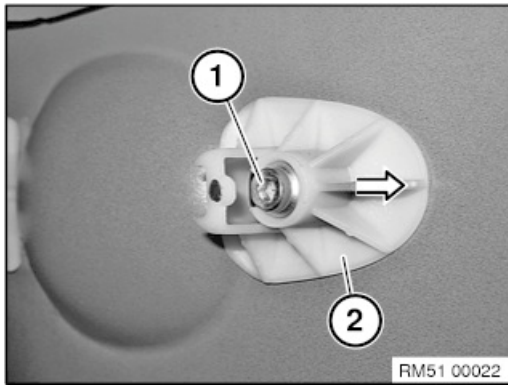
Lever out seal plugs (1).



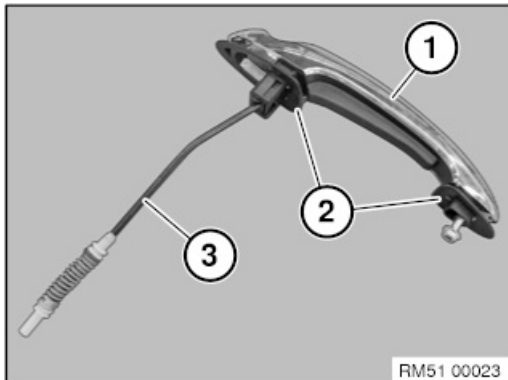
Undo screws (1) on retaining element.

Tightening torque 51 22 8AZ.





Loosen screw (1) at front of outer door handle until retaining element (2) can be fed out toward front and placed to one side.
Tightening torque 51 22 8AZ.



Note:

Shown removed here for purposes of clarity.

Feed outer door handle (1) out of door with Bowden cable (3) and place it to one side. *Installation note:*

Rubber seals (2) of outer door handle (1) must not be missing or damaged.





Necessary preliminary work:

- Remove rear door trim panel



All further operations are identical to:

Removing and installing/renewing weather strip on inner front door



51 22 300
rear door

Removing and installing/replacing weather strip on outside of



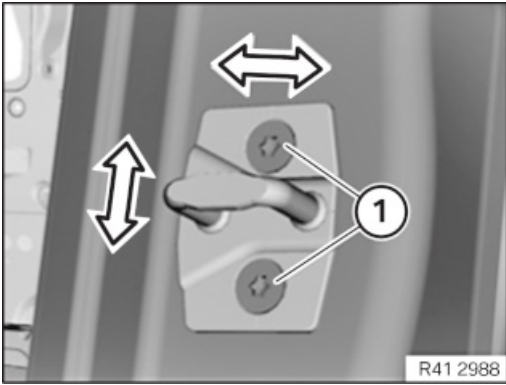
Operations identical to:

- Removing and installing or replacing weather strip on outside of left or right front door



51 22 001

Replacing door detent (lock striker), rear left or right



Release screws (1).

Remove lock striker.

Tightening torque 51 22 7AZ.



Concluding tasks

- Adjust lock striker

This operation is described in: Adjust doors.



51 23 004

Adjusting engine compartment lid catch



Operation is described in:

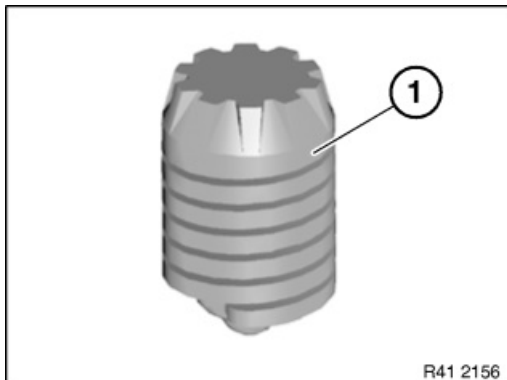
Adjusting engine compartment lid



51 23 ... Adjusting/replacing bump stops



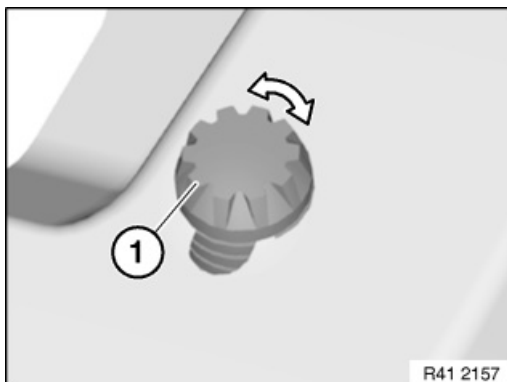
The illustrations are schematic representations and are to be applied to the relevant vehicle type.



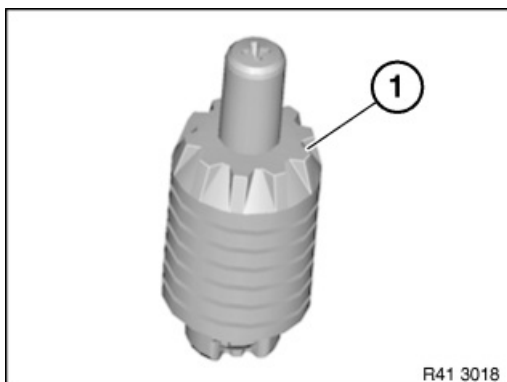
Version 1:

Following parts must not be damaged:

- (1) Bump stop



Adjust bump stop (1) to correct height by turning left or right.

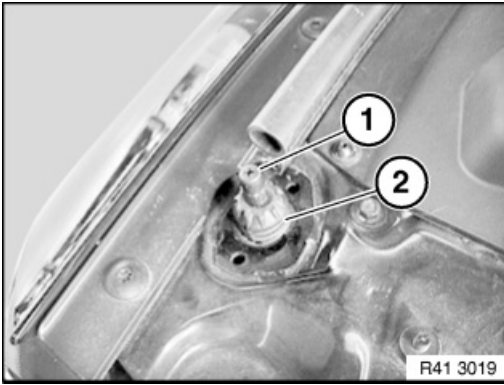


Version 2:

Replace damaged bump stops (refer to EPC):

- (1) Bump stop with ejector



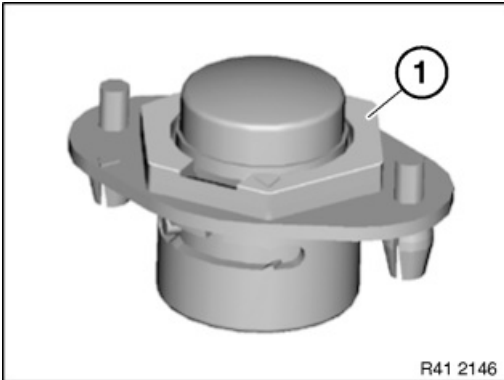


Press ejector (1) into bump stop and, in this position, twist approx. 90° counterclockwise with a Phillips screwdriver.

This locks the ejectors (1) in the bump stops.

Adjust bump stop (2) to correct height by turning left or right.

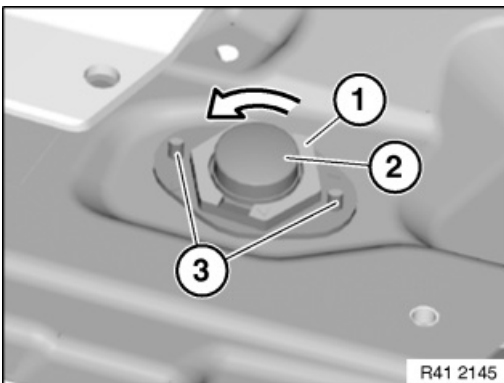
Unlock the ejector (1) again after completing adjustment.



Version 3:

Replace damaged bump stops (refer to EPC):

- (1) Bump stop



Turn lock (1) 45° counterclockwise.

Pull bump stop (2) upwards.

Close lid slowly until it is at the same height as the side panel.

Open lid and turn lock (1) clockwise.

Installation:

Press bump stop into panel and drive in expanding pins (3).

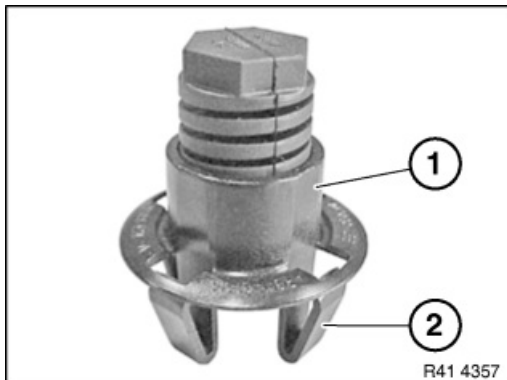


51 23 ... Adjusting/replacing bump stops



The graphics are schematic representations and are to be applied to the relevant vehicle type.

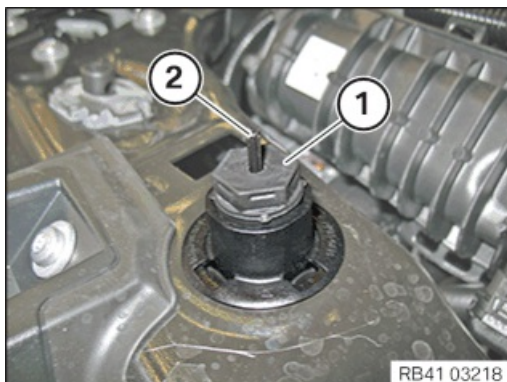
Prerequisite: Lid must be correctly adjusted.



Following parts must not be damaged:

- (1) Bump stop
- (2) Catches

Remove adjusting buffer by pressing latch mechanisms back.

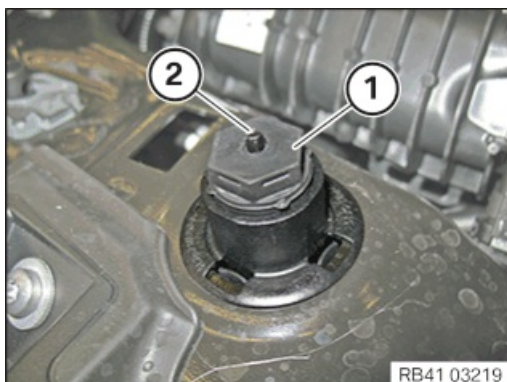


Screw adjusting buffer (1) until the pin (2) can be pulled out.

Slowly pull the pin (2) out approx. 15 mm.

Slowly close engine compartment lid.

The pin (2) is thus pushed into the adjusting buffer (1).



Raise engine compartment lid.

Unscrew the adjusting buffer (1) until it is flush with the upper edge of the pin (2).

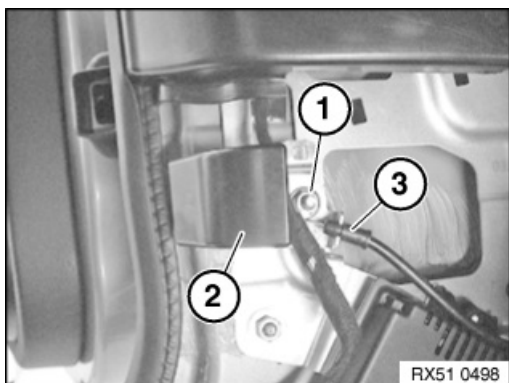


51 23 200 Remove, install/replace lever with console for engine compartment lid catch



Necessary preliminary tasks:

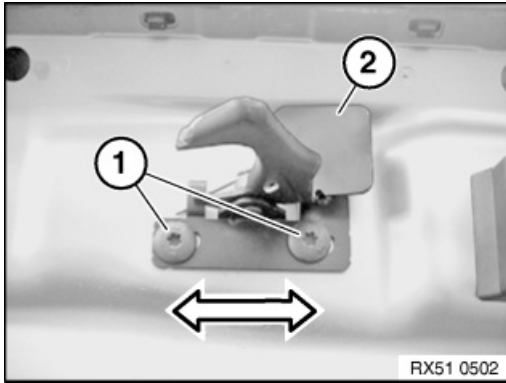
- Remove left door sill cover strip



Slacken nut (1).

Remove lever (2) and disengage Bowden cable (3).





Release screws (1) and remove arrester hook (2). *Installation note:*
Adjust arrester hook (2) to lock carrier.
Tightening torque 51 23 2AZ.

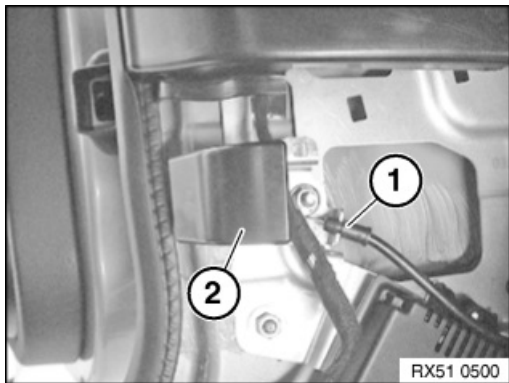


51 23 212 Removing and installing/replacing cable for front engine hood/bonnet locks (in passenger compartment)



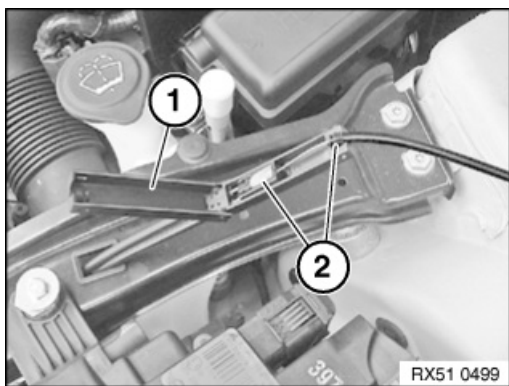
Necessary preliminary tasks:

- Remove left cowl panel cover
- Remove left door sill cover strip



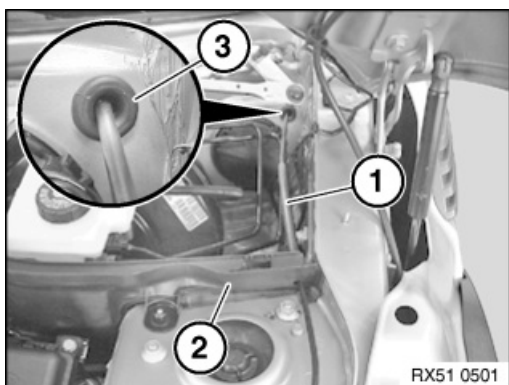
Disengage cable (1) at lever (2).

If necessary, disengage cable (1) at guide clips up to bulkhead.



Lever out coupling (1) and open.

Disengage cable (2).



Feed cable (1) out of front bulkhead (2).

Feed cable (1) with grommet (3) out of rear bulkhead.

Installation note:

Make sure grommet (3) is correctly seated on rear bulkhead.

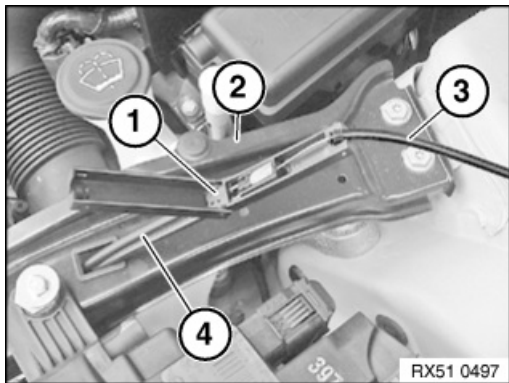


51 23 215 Removing and installing/replacing cable for front hood/bonnet locks (in engine compartment) on right and left



Necessary preliminary work:

- Remove both engine compartment lid catches



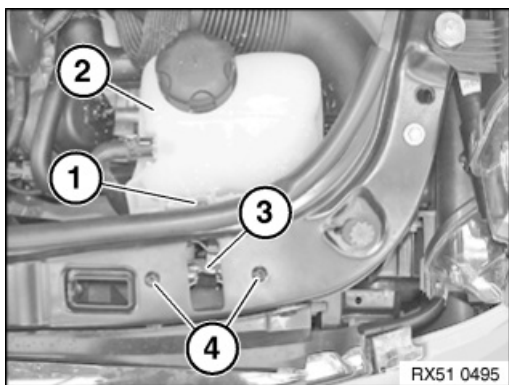
Unclip coupling (1) from lock carrier (2).

Open coupling (1) and disengage cable (3).

If necessary, release cable (4) from retainers at lock carrier (2).

Feed out coupling (1) with cable (4).



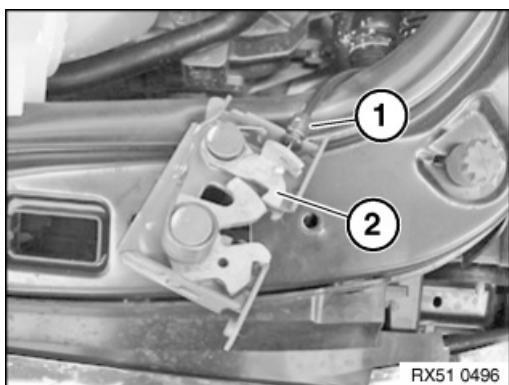


Release screw (1).

Feed out expansion tank (2) and lay to one side.

Release screws (4) and feed out hood/bonnet lock (3).

Tightening torque 51 23 3AZ .



Disengage Bowden cable (1) in direction of arrow from engine compartment lid lock (2).



51 23 265 Removing and installing/replacing left or right gas pressure spring for engine compartment lid



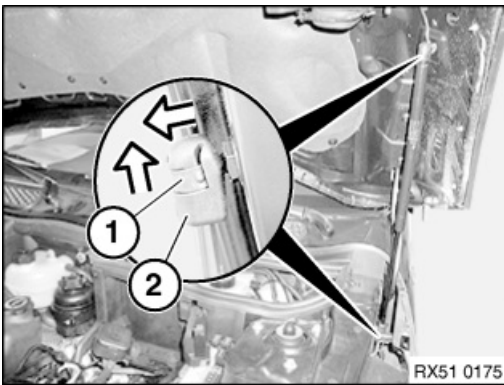
Warning!

Danger of injury!

Use suitable tool to support bonnet in the fully opened position.



Removal:



Make a written record of the installation position of the gas pressure springs before removing.

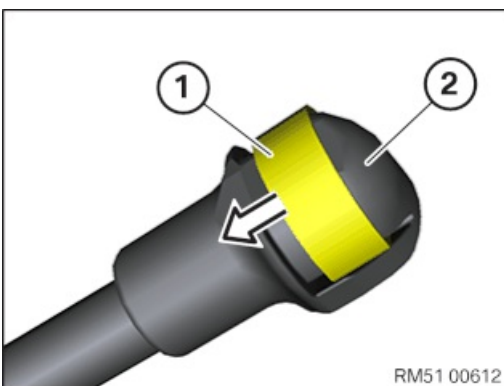
If necessary, release cable clip on gas pressure spring (2).

Slide retaining spring (1) to end of gas pressure spring (2) and lift of gas pressure spring (2) from ball head.

Repeat procedure at other end of gas strut (2).



Installation:



Slide retaining spring (1) back into initial position.

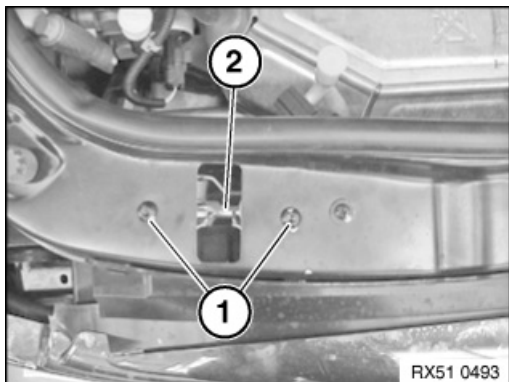
Press the gas pressure spring (2) onto the ball pins on the vehicle at the top and bottom end.

Gas pressure spring (2) must be felt to engage.

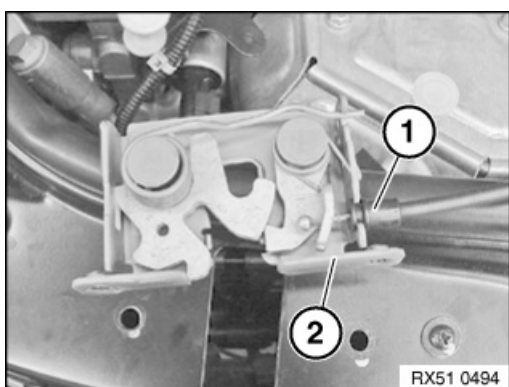


51 23 100 lock

Removing and installing/replacing right engine compartment lid



Release screws (1) and feed out bonnet lock (2) sideways.
Tightening torque 51 23 3AZ .



Disengage Bowden cable (1) from hood/bonnet lock.

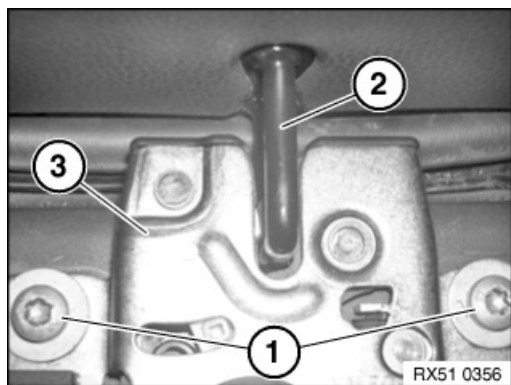


**Note:**

tailgate must be correctly adjusted before adjustment of tailgate lock.
If necessary, adjust tailgate.

Necessary preliminary tasks:

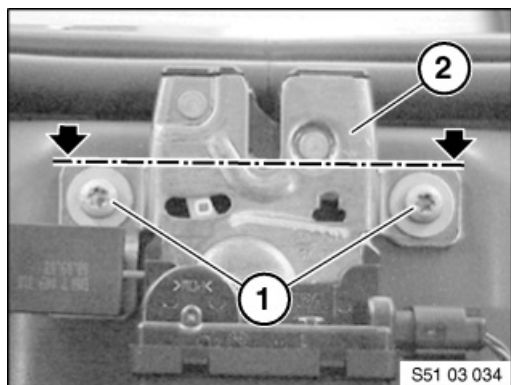
- Screw in tailgate bump stops completely
- Remove cover on tail panel

**Adjusting tailgate lock:**

Slacken screws (1) on tailgate lock (3) until lock is just able to be move and centres itself.

Close tailgate and keep release button pressed so that tailgate lock snaps closed.

Striker (2) must be centrally positioned in tailgate lock (3).

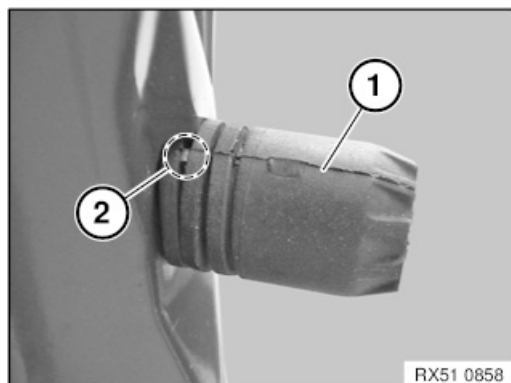


Open tailgate.

Adjust tailgate lock (2) vertically so that upper edges of washers are flush with edge of tailgate lock (2).

Tighten down screws (1).

Tightening torque 51 24 1AZ.



Turn stop pad (1) until cast-on rib (2) rests on tailgate.

Check alignment and closing function of tailgate and tailgate lock; readjust stop pad (1) if necessary.

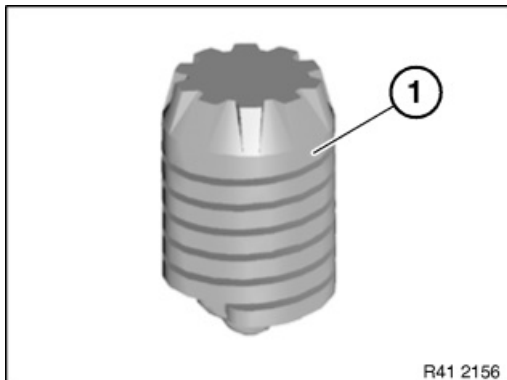
Turn stop pad (1) max. ± 1 turn.



51 23 ... Adjusting/replacing bump stops



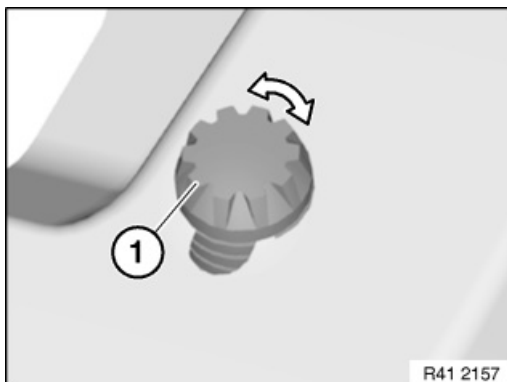
The illustrations are schematic representations and are to be applied to the relevant vehicle type.



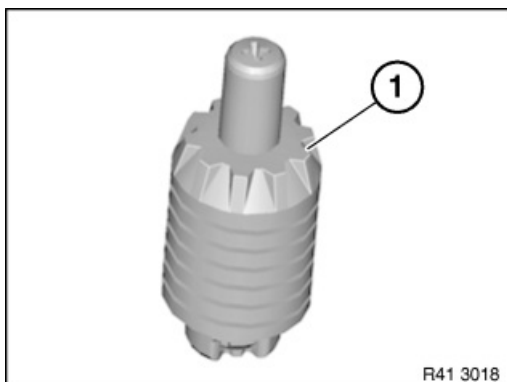
Version 1:

Following parts must not be damaged:

- (1) Bump stop



Adjust bump stop (1) to correct height by turning left or right.

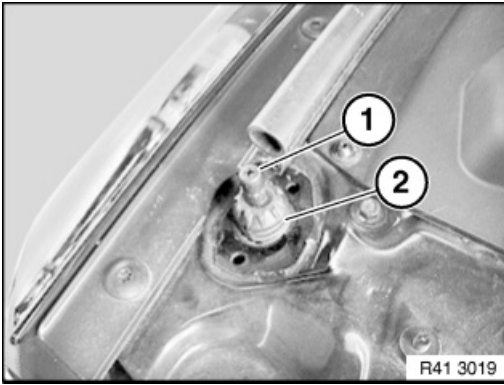


Version 2:

Replace damaged bump stops (refer to EPC):

- (1) Bump stop with ejector



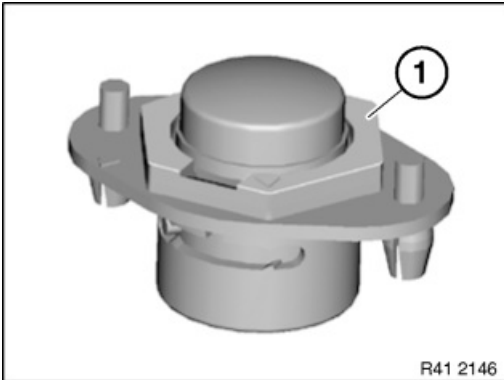


Press ejector (1) into bump stop and, in this position, twist approx. 90° counterclockwise with a Phillips screwdriver.

This locks the ejectors (1) in the bump stops.

Adjust bump stop (2) to correct height by turning left or right.

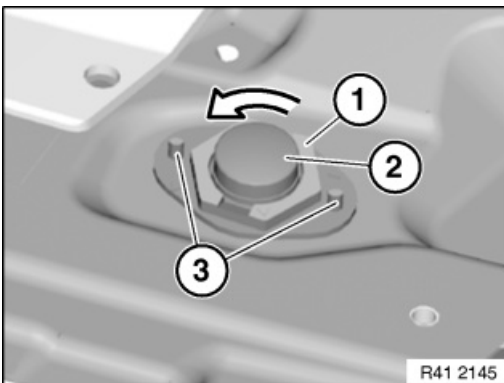
Unlock the ejector (1) again after completing adjustment.



Version 3:

Replace damaged bump stops (refer to EPC):

- (1) Bump stop



Turn lock (1) 45° counterclockwise.

Pull bump stop (2) upwards.

Close lid slowly until it is at the same height as the side panel.

Open lid and turn lock (1) clockwise.

Installation:

Press bump stop into panel and drive in expanding pins (3).



51 24 300 Removing and installing or replacing left or right gas pressure spring for tailgate



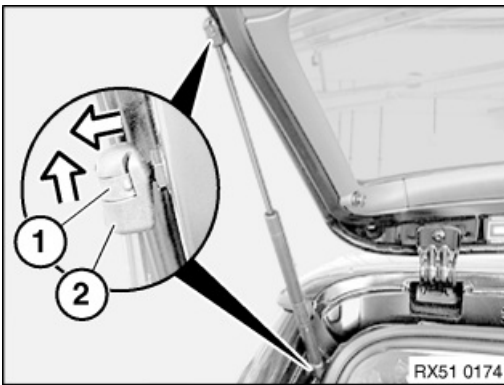
Warning!

Danger of injury!

Support tailgate in fully opened position with suitable device.



REMOVAL:



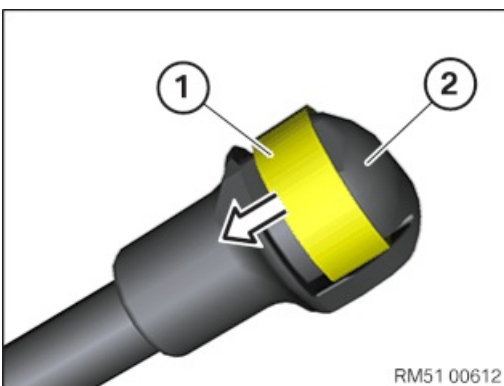
Make a written record of the alignment of the gas pressure support(s) before removing.

Slide retaining spring (1) to end of gas pressure spring (2) and lever out gas pressure spring (2) from holder.

Repeat procedure at other end of gas pressure spring (2) and remove gas pressure spring (2).



INSTALLATION:



Slide retaining spring (1) back into initial position.

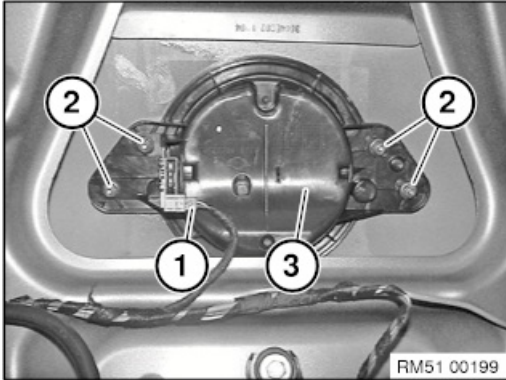
Press gas pressure spring (2) on top and bottom end onto mountings on vehicle.

Gas pressure spring (2) must be felt to engage.



**Necessary preliminary tasks:**

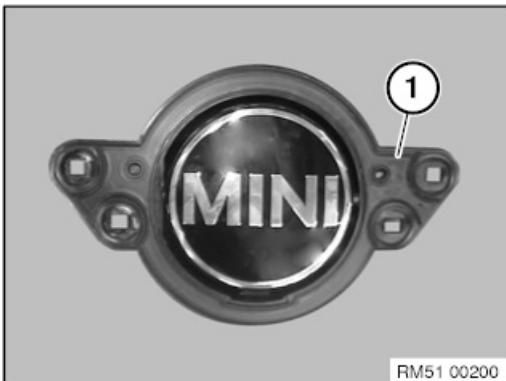
- Remove trim for rear lid



Unfasten plug connection (1) and disconnect.

Release nuts (2) and remove button.

Tightening torque 51 24 13AZ.

**Installation note:**

Gasket (1) must not be damaged.

Perform function check with tailgate open.

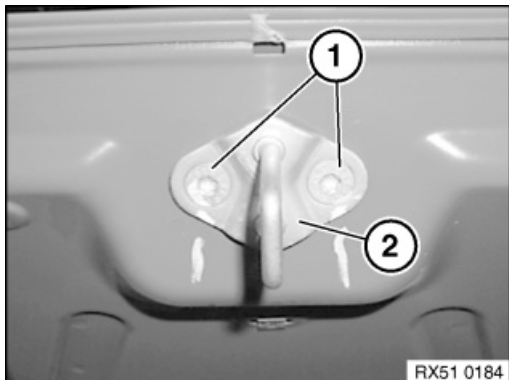
Replacement:

Modify Mini plate.



**Necessary preliminary tasks:**

- Remove trim for rear lid



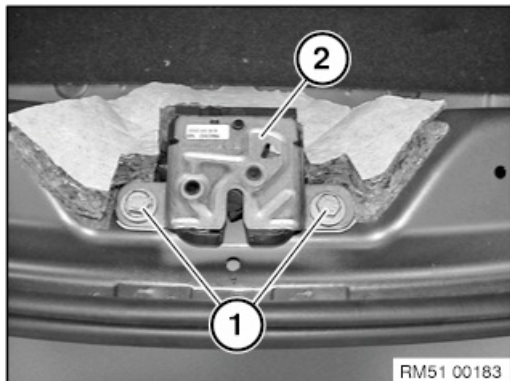
Release bolts (1) and remove striker (2).

Tightening torque 51 24 2AZ.



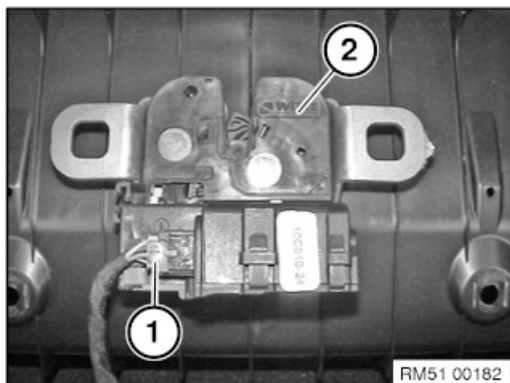
**Necessary preliminary tasks:**

- Remove cover from tail panel



Release screws (1) on tailgate lock (2).

Tightening torque 51 24 1AZ



Unfasten plug connection (1) and disconnect.

Remove tailgate lock (2).

Installation note:

Adjust tailgate catch.



51 31 ... General procedure for the disassembly and installation of bonded window glass

1 General information

Follow general instructions on window bonding.

Materials needed for window bonding.

The vehicle can be towed away or driven without a windscreen, rear window and side window.

When carrying out disassembly/installation work and during the hardening time, the vehicle must be standing on its wheels on a level surface.

The windscreen, rear window and side windows are glued to the body. This bonding will increase the torsional rigidity of the vehicle. To obtain perfect bonding, comply with the installation procedure described in the following.

2 Disassembly

2.1 Disassembly in general

The following dismantling methods are applied, according to the version:

- Oscillating knife (not permissible for vehicles with window bonding on carbon body components)
- Cutting wire with wire pull handles
- "Spider" window glass removal system (unsuitable for severely damaged window glass)

Note:

When cutting out the window glass with wire pull handles, there is a risk of damage to the window glass if the wire is pulled over the window edge.

Unless otherwise described, only use this method when replacing the window glass.

Follow the vehicle-specific repair instructions!

2.2 Disassembly of damaged window glass

The disassembly method described in the REP may be unsuitable depending on the degree of damage.

- e.g. suction cups cannot be attached to window glass around cracks
- Damaged window glass may damage and tear the nylon string

Attention! Risk of damage!

Use one of the other disassembly methods at your own discretion in the event of severely damaged window glass.

Make sure adjacent components are adequately protected.

3 Installation

3.1 Preparation

Position the windscreen or rear window on a universal work top or secure the components on a tool trolley using suction lifters.

Attach two suction lifters to the outsides of the window glass in the event of storage on a universal work top.

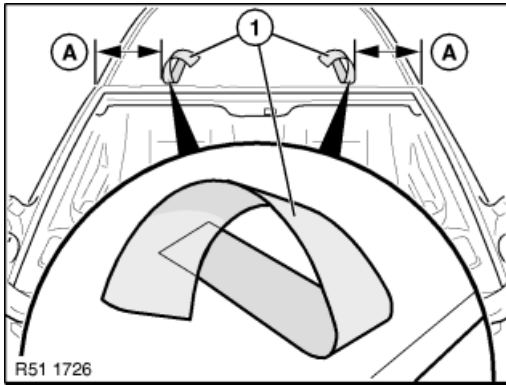
According to its size, fix side and door window glass onto the tool trolley using suction lifters or special tool 51 3 220 and set down on a suitable support.

Always keep the suction faces of the window glass suction lifters dry and clean.

Note:



If accessibility is restricted, insert the window glass on a trial basis.



Bond two yellow plastic adhesive tapes (1) approx. 400 mm in length to the roof.

(A) = 250 mm

Only the yellow plastic adhesive tape may be used to fix the window glass.

The glass will slip down if other adhesive tapes are used.

Window glass slippage will result in leaks and wind noises.

After completing the paint work, the paint must be fully hardened before the plastic adhesive tapes are applied.

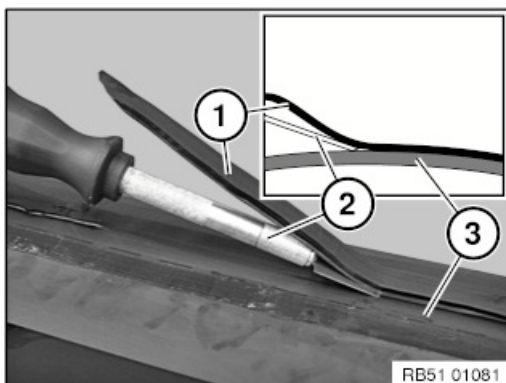
3.2 Pre-treatment of bonding surfaces

- Protect the vehicle interior against contamination, cover the Head-Up Display.
- Clean window glass and body aperture (with residual adhesive bead) with cleaning agent R2
Attention! Do **not** use Sika remover 208 for cleaning in the adhesive area.
- Observe an air drying time of at least 5 minutes (at least 15 minutes when applied to residual adhesive bead)
- Remove residual adhesive bead from body and window glass (see point 3.3)
- Touch up paintwork damage to body aperture with BMW multibase filler (except for carbon body components)

Pretreatment on new body component (no residual adhesive beads present):

Surface	Pretreatment
Panel painted	Wipe cleaning agent R1 dry with a paper towel or observe the air drying time of at least 1 minute
Carbon	Only cleaning agent R2
Carbon painted (e.g. roof outer skin M3)	Wipe cleaning agent R1 dry with a paper towel or observe the air drying time of at least 1 minute
Plastic (e.g. I01 A-pillar)	Cleaning agent R2 and ScotchBrite Multiflex abrasive pad

3.3 Remove adhesive residue from the body and window glass



Do not remove residual adhesive bead (1) until shortly before bonding.

Use the pitchweld scraper to remove the residual adhesive bead (1) from the body aperture and window glass (3).

Position the pitchweld scraper (2) as shown and remove the residual adhesive bead (1) up to a thickness of approx. 0.5 mm.

Attention!

Carbon body components are not to have scratches with a depth greater than 0.2 mm.

Note, comply with life module check!

3.4 Installation of spacer (spacer buffer / dual-lock tapes)

Completely remove all residue of existing spacers before bonding new adhesive spacers.

The exact position of the spacers must be retained (see vehicle-specific repair instructions).



Incorrectly fitted spacers will result in:

- Window glass breakage due to tension
- leakage (if the spacer is in the adhesive area)
- Wind noises

3.5 Add-on part

Depending on the version, attach sealing, expanding foam tape, rain sensor, etc.

Observe Overview of additional work with rain sensor when working with versions including the rain sensor!

Follow the vehicle-specific repair instructions!

3.6 Pre-treatment of new window glass

- Apply a thin coat of glass activator (yellow stick); a final wipe is not necessary.
- Observe an air drying time of at least 2 minutes

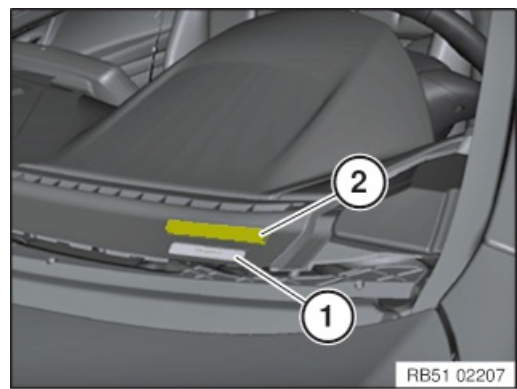
The glass activator is used for adhesion between glass or ceramic glass and the adhesive. Therefore, a thin, homogeneous and continuous line of glass activator must be applied. If the window glass is to be reused with a cut-back adhesive bead, glass activator is not needed.

It must be guaranteed that a 1 to 2 mm wide line of glass activator is located on the ceramic glass next to the squeezed adhesive bead.

The adhesive bead may become up to 15 mm wide in compressed condition. The width of the glass activator is therefore normally a minimum of 17 mm for windscreens and rear windows and a minimum of 9 mm for side windows.

The glass activator may not be applied in the field of view or the point grid. Fresh glass activator in the field of view must immediately be wiped off with cleaning agent R2 because hardened glass activator will leave a haze behind.

3.7 Version with inspection glass for vehicle identification number in windscreen



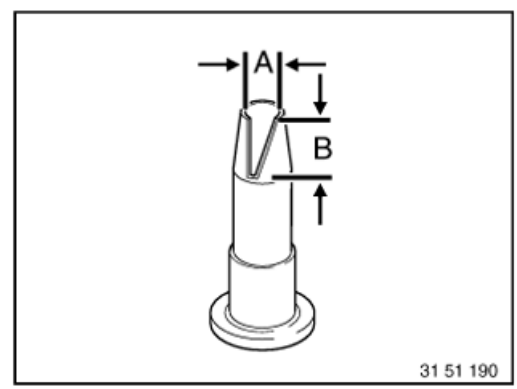
Foam tape (2) must be installed to protect the vehicle identification number (1) against tampering. If necessary, install foam tape 07 14 7 222 909.

Close off the inspection glass on the windscreen (bottom left) with Sika bonding base VP 206.

Except for:

- All US/GB models
- All models with a black dashboard cover, which means that the vehicle colour cannot be seen through the inspection glass

3.8 Nozzle preparation



Use the standard nozzle C for windscreens, rear windows, and body-specific fixed side window glass.

A	8 ±1 mm
B	12 ±1 mm

Prepare plastic nozzle for fixed door window glass.

A	8 ±1 mm
B	15 ±1 mm



Deviations are described in the vehicle-specific repair instructions.

Black ceramic glass impermeable to UV light is located on the peripheral zone of the inside of the window to protect the adhesive bead.

Ceramic glass must not be damaged.

3.9 Apply adhesive

Adhesive is applied to the window glass using a cartridge gun.

Glue cartridge must be vertical to window glass.

The almost vertical part of the adhesive bead must be facing the outer window glass edge.

On window glass with guidelines, the adhesive bead must be applied centrally between the guidelines.

On window glass without guidelines, the position of the adhesive bead is specified in the vehicle-specific repair instructions.

Coat bead joint.

Effect of differing adhesive quantities:

Too little adhesive:	Too much adhesive:
<ul style="list-style-type: none">• Window glass rests too low in body aperture• Insufficient squeezing of adhesive bead (leaking)	<ul style="list-style-type: none">• Window glass rests too high in body aperture• Wind noise may occur• Strains/tensions may occur (window glass breakage)• Dirt contamination of add-on parts by emerging adhesive• Adhesive on uninsulated strainer pressure lines of aerial(s) (interference of reception)

Note on bonding of windscreen:

The adhesive amount specified in the vehicle-specific repair instructions is sufficient if the specified adhesive bead size is maintained.

If too much adhesive is applied due to application-related variations (manual application), the specified adhesive amount may not be sufficient. To avoid interrupting adhesive application for longer than the permitted period, have another glue cartridge ready.

Attention!

Once the adhesive bead has been applied, the window glass must be installed within 7 minutes (depending on air humidity, temperature).

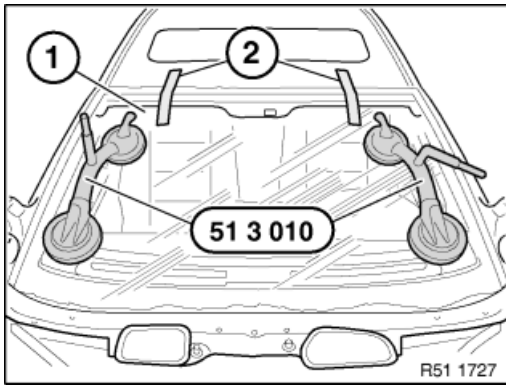
After 7 minutes the adhesive bead forms a skin which can no longer guarantee a perfect bond.

3.10 Mounting the window glass

To prevent a pressure build-up in the passenger compartment when the doors are closed:

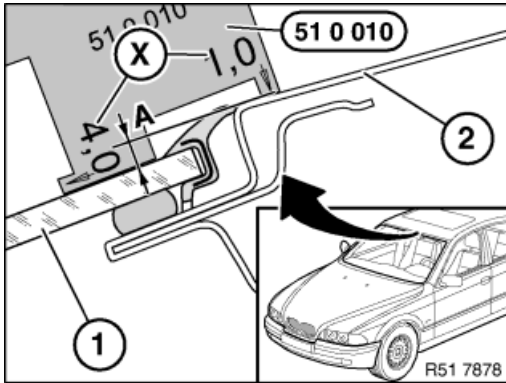
- Open a side window





Mount window glass (1) with suction lifter (51 3 010).

3.11 Adjusting the window glass



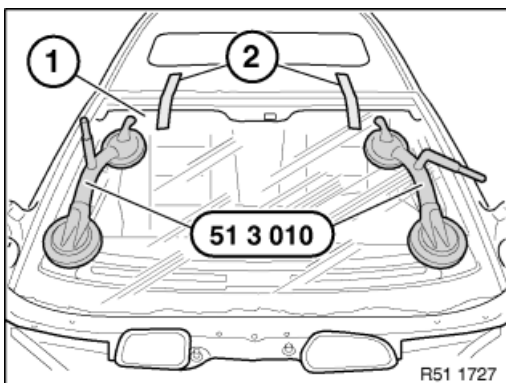
To avoid wind noise, the front and rear windows (1) must be lower than the roof outer skin (2).

Check ride height of the windscreen or rear window using special tool 51 0 010.

Dimension (A) of window glass offset, refer to vehicle-specific repair instructions.

X = measurement stages 1 ... 4 mm

3.12 Fixing the window glass



Fix the window glass with yellow plastic adhesive tapes (2).

Immediately remove dirt contamination with adhesive residue using Sika remover 208. Do not press out the window glass again.

Hardened adhesive can only be removed mechanically.

3.13 Label

Depending on version, apply label.



51 31 ... Materials for bonding window



Special tools required:

- 51 3 220

1 Tools

Type	Type	Order/part number
Electric special cutter	SuperCut FSC 1.6Q	81 43 2 296 987
Knife set		81 43 9 428 596
Contains:		
Knife (U-shape)	24 / 36 / 45 mm	
Knife (L shape)	25,4 mm	
Knife (straight with stop roller)	16 to 43 mm (adjustable)	
	14 mm (fixed)	
"Roll Out 2000"	Wire cutting system	81 62 0 301 768
"Spider"	Cutting system with nylon string	81 43 2 357 248
Wire pull handles		81 43 2 326 501
Cartridge gun		81 49 2 213 059
Pinchweld scraper set		81 62 0 410 436
Siphon		81 64 2 184 377
Single suction cup	Special tool	51 3 220
Universal work table		81 49 0 151 675

2 Consumables:

Naming of Electronic Parts Catalogue	Designation, repair instructions /addition	BMW part number
Window glass repair kit, cold, 1 hour	Small repair kit	83 19 2 289 285 83 19 2 289 180 (US) 83 19 2 180 001 (China)
Window glass repair kit, cold, 1 hour	Large repair kit Like small repair kit, plus 1x window glass adhesive 300 ml	83 19 2 360 680 (not available for the US/China)
Cutting wire for glass repair	Cutting wire, square	83 19 2 150 267
Nylon string	Nylon string	81 43 2 344 272
Multi-base filler	BMW multibase filler	
Cleaning agent R1	Cleaning agent R1	83 19 2 211 217
Cleaning agent R2	Cleaning agent R2	83 19 0 417 324
Adhesive tape	Plastic adhesive tape, yellow	83 19 9 410 979
Adhesive cleaner 208	Sika remover 208	83 19 9 407 780
Aktivator 205	Sika Aktivator 205 (e.g. for rubber frame on windscreen)	83 19 0 030 155



Bonding base VP 206	Sika bonding base VP 206 (e.g. for inspection glass for vehicle identification number)	83 19 9 407 777
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Storage of all consumables

Dry at 15 ° - 25 °C.



51 31 ... Notes on window bonding repair kit

	Part number	Part number (US)	Part number (China)
Small repair kit	83 19 2 289 285	83 19 2 289 180	83 19 2 180 001
- Window glass adhesive 300 ml	83 19 2 289 286	83 19 2 289 181	83 19 2 180 002
- Glass activator	83 19 0 444 142		
- C nozzle	83 19 2 155 589		
- Plastic nozzle and paper tissue			
Large repair kit (Contains an additional window glass adhesive 300 ml)	83 19 2 360 680	Not available	Not available

Important!

Before working with the consumables, note the following information.

- Country-specific safety and industrial safety regulations
- Material safety data sheet of manufacturer
- Processing instructions on the packaging

1 Storage and processing of all consumables

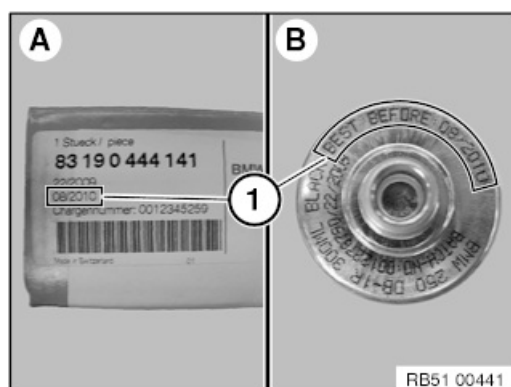
Dry at 15 ° - 25 °C.

2 Expiry date of adhesive:

Repair kit and glue cartridges are marked with a date (expiry).

Date (1) refers to the calendar week and year (KW/JJJJ).

The adhesive cannot be used after this date (1).



3 Hardening of adhesive:

The adhesive hardens by reacting with air humidity at room temperature.

Important!

Once the adhesive bead has been applied, the window glass must be installed within 7 minutes (depending on air humidity, temperature).

After 7 minutes the adhesive bead forms a skin which can no longer guarantee a perfect bond.

At ambient temperatures above 23 °C and 50 % relative air humidity (hot countries), the adhesive open time is



shortened to approx. 5 minutes (skin formation time).

A relative air humidity of < 30% significantly slows hardening.

The adhesive hardening process is interrupted completely at ambient temperatures below 5 °C. In this event, there will be no increase in the strength of the bonded connection.

3.1 Minimum hardening time:

Minimum hardening time is reached beginning at 22 °C and 38 % relative air humidity.

- 1 hour, vehicles without front passenger airbag (after which vehicle can be moved)
- 2 hours, vehicles with front passenger airbag in countries without mandatory seat belt usage

Note:

In vehicles with front passenger airbag in countries without mandatory seat belt usage:

The vehicle can be transferred to the customer after a 1-hour hardening time with the following warning:

Once the windscreen glass has been bonded, all occupants must travel with their seat belts attached for 1 hour.

Important!

If the minimum hardening time is not adhered to, an accident can cause the passenger together with the windscreen to fall out of the vehicle after the front passenger airbag deploys.

During the minimum hardening time of 1 hour, the vehicle must not be subjected to load on one side such as e.g.:

- one wheel on kerb
- vehicle hoist
- etc.

Manoeuvring inside garage/workshop:

- only permitted on level ground
- do not under any circumstances drive over approach ramps, e.g. into multi-storey car parks

Do not remove adhesive tapes until after hardening time.

If the minimum hardening time of 1 hour is undercut, leaks and wind noises may occur at the window glass.

4 Disposal of adhesive:

Hardened adhesive is disposed of as normal waste.

Non-hardened adhesive, glue cartridge and mixtures of adhesive and solvents and the like must be disposed of as hazardous waste.

The adhesive is disposed of in paper sacks so that it can react with moisture.

5 Glass activator:

Warning!

Wear cut resistant gloves when breaking the glass ampule.

Prepare glass activator for processing by shaking and snapping (breaking glass ampoule).

Apply glass activator by pressing gently. There is no need for final wiping. Air drying time approx. 2 minutes.

6 Expiry date of glass activator:



Repair kit and glass activator are marked with a date (best before date).

- The glass activator may only be used up to this date (if not already opened previously).
- After opening, keep only for one week even if the expiry date has not yet been reached.

7 Disposal of glass activator:

Glass activator must not be disposed of as part of household waste.

Glass activator must be disposed of as hazardous waste.



61 35 ... Overview, rain sensor (additional work when replacing the windscreen / sensor replacement)

- **1-Series:** E8x
- **3-Series:** E9x
- **5-Series:** E6x
- **6-Series:** E6x
- **X1:** E84
- **Z4:** E89

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor/ Programming/encoding necessary	When replacing the sensor/ Initialisation required	Connecting the diagnosis system required
Condensation sensor square 30 x 20 mm	Yes	No	No	No

- **5-Series:** E6x
- **6-Series:** E6x
- **7-Series:** E6x

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing substitute visuals Programming/encoding necessary	When replacing the sensor/ substitute visuals Initialisation required	Connecting the diagnosis system required
all types square 60 x 40 mm	No	Yes	-	Yes	Yes
RLS approximately ø 50 mm	No (new substitute visuals required, refer to Electronic Parts Catalogue)	-	No	Yes	Yes

- **X5:** E70
- **X6:** E7x



Sensor type/ Sensor shape	With windscreen replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing substitute visuals Programming/encoding necessary	When replacing the sensor/ substitute visuals Initialisation required	Connecting the diagnosis system required
RLPSS (Rain, light and precipitation solar sensor) (Designation is located on the back of the sensor) approximately ø 50 mm	Yes	Yes	-	Yes	Yes
RLS (vehicle with no HUD) (Designation is located on the back of the sensor) approximately ø 50 mm	No (new substitute visuals required, refer to Electronic Parts Catalogue)	-	No	Yes	Yes
RLSS (vehicle with HUD) (Designation is located on the back of the sensor) approximately ø 50 mm	Yes	Yes	-	Yes	Yes

- **1-Series:** E8x
- **3-Series:** E9x
- **X1:** E84
- **X3:** E83
- **Z4:** E89

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing the sensor Initialisation required	Connecting the diagnosis system required
all types square 60 x 40 mm	No	Yes	Yes	Yes

- **5-Series:** F1x
- **5 Series GT:** F07
- **6-Series:** F06, F1x



- **7-Series:** F0x
- **X3:** F25
- **X4:** F26

Sensor type/ Sensor shape	With windscreen replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing substitute visuals Programming/encoding necessary	When replacing the sensor/ substitute visuals Initialisation required	Connecting the diagnosis system required
all types approximately ø 35 mm	No	No	-	Yes	Yes
all types approximately ø 50 mm	Yes	Yes	-	Yes	Yes
Only for F25 : RLS approximately ø 50 mm	No (new substitute visuals required, refer to Electronic Parts Catalogue)	-	No	Yes	Yes

- **X5:** F15, F85
- **X6:** F16, F86

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing the sensor Initialisation required	Connecting the diagnosis system required
all types approximately ø 35 mm	No	No	No	No

- **1-Series:** F2x
- **2-Series:** F2x
- **3-Series:** F3x, F8x
- **3 Series GT:** F34
- **4-Series:** F3x, F8x

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing the sensor Initialisation required	Connecting the diagnosis system required
------------------------------	--	---	---	---



all up to 03/2014 except SBS (01) (Designation is located on the back of the sensor) approximately ø 35 mm	No	No	Yes	Yes
SBS (01) (Designation is located on the back of the sensor) approximately ø 35 mm	No	No	No	No
All as from 03/2014 approximately ø 35 mm	No	No	No	No

• **2-Series: F4x**

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing the sensor Initialisation required	Connecting the diagnosis system required
all types	No	No	No	No

BMW i:

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing the sensor Initialisation required	Connecting the diagnosis system required
all types approximately ø 35 mm	No	No	No	No

BMW from G series

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing the sensor Initialisation required	Connecting the diagnosis system required
all types	No	No	No	No

MINI (all):

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing the sensor Initialisation required	Connecting the diagnosis system required
all types square 60 x 40 mm	No	Yes	Yes	Yes



all types approximately ø 35 mm	No	No	No	No
---	----	----	----	----

Rolls-Royce:

- RR1
- RR2
- RR3
- RR4
- RR5
- RR6

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing the sensor Initialisation required	Connecting the diagnosis system required
all types square 60 x 40 mm	No	Yes	Yes	Yes
all types approximately ø 35 mm	No	No	Yes	Yes
all types approximately ø 50 mm	Yes	Yes	Yes	Yes

Rolls-Royce:

- RR11
- RR12

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing the sensor Initialisation required	Connecting the diagnosis system required
all types approximately ø 35 mm	No	No	No	No



51 31 ... Remove windscreen with "Roll Out 2000"



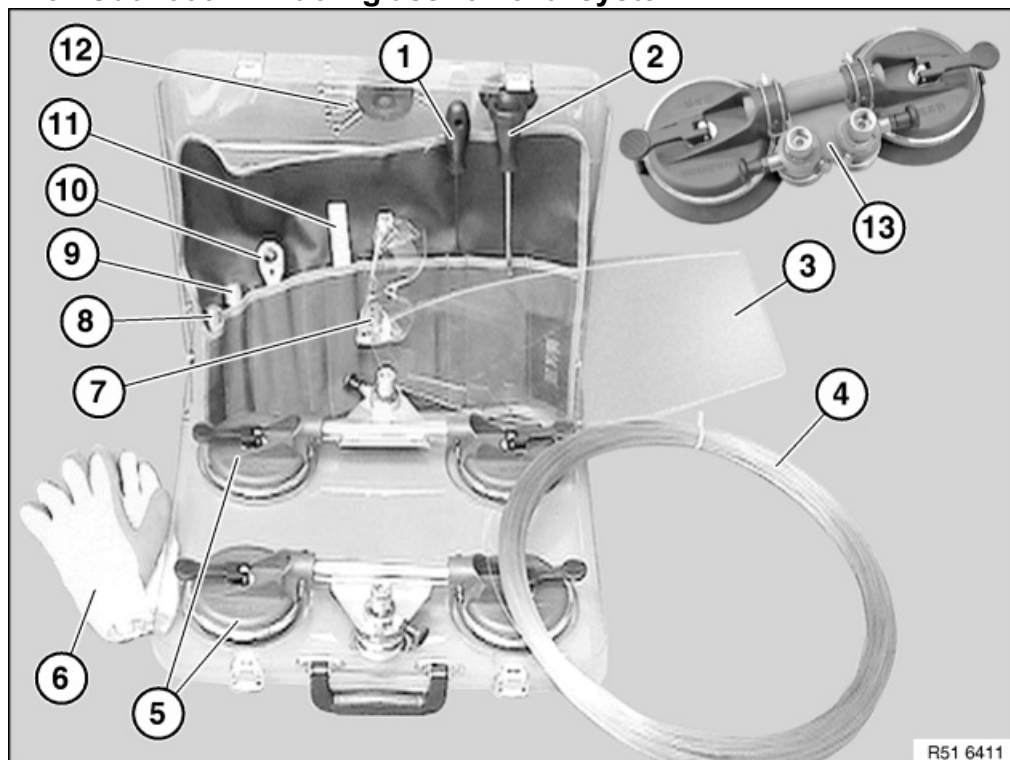
Special tools required:

- 2 150 267



"Roll Out 2000" has been replaced by the "Spider" removal system. "Roll Out 2000" may still be used. The "Spider" removal system is recommended for removing window glass.

"Roll Out 2000" window glass removal system



- | | |
|-----------------------|---|
| 1 Wire starter | 8 Extension (short) |
| 2 Parabolic tool | 9 Extension (long) |
| 3 Plastic washer | 10 Reversible ratchet |
| 4 Wire cutting roller | 11 Plastic wedge |
| 5 Suction cup lifters | 12 Guide needles |
| 6 Protective gloves | 13 Suction cup lifter with double spool |
| 7 Safety goggles | |



Note:

Both paint and ergonomic and health-endangering damage is minimised with the "Roll Out 2000" system.

Sourcing reference:

See Aftersales Assistance Portal (ASAP) - Service/Technical - Workshop Equipment (Start BMW) - Shop Workshop Equipment or at www.bmwgroup.com



**Warning!**

Follow safety instructions for working on vehicles with airbag systems (risk of injury).

Important!

Take care when handling sharp-edged tools and cutting wire (risk of damage to head airbag and window glass).

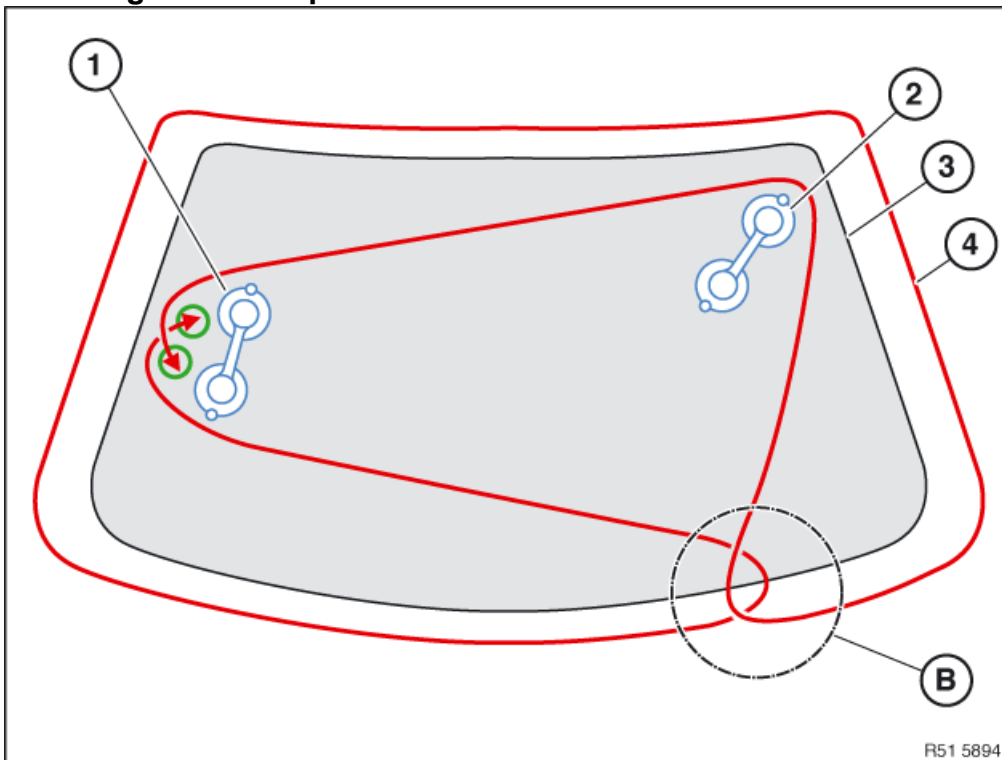
**Important!**

Always keep both suction cups dry and clean to ensure their optimum adhesion on the windscreen.

Suction cup may not be applied at the damaged point (crack in window glass).

Lubricate spool if lock rattling becomes too loud.

Always wear safety goggles and protective gloves for your own safety.

Mounting suction cup lifters on windscreen or rear window:

- Secure position of lifting jacks as shown (view from outside):

1. Suction cup lifter with double spool
2. Suction cup lifter with single spool (as deflection point)
3. Window
4. Cutting wire

Note:

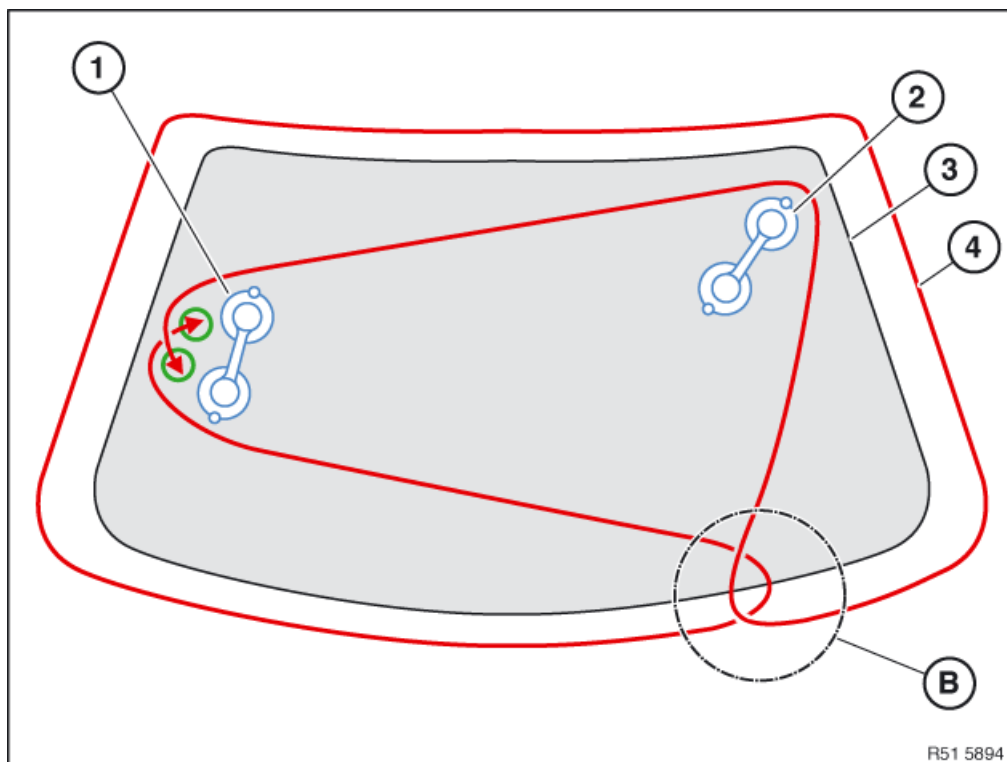
Optimum cutting is guaranteed when the cutting wire is at an acute angle to the adhesive bead. There is a risk of the cutting wire breaking if the angle is too obtuse.

The suction cup lifter (2) is used as the deflection point to achieve the corresponding angle.

Depending on the window glass version and the effort applied during cutting, it may be necessary to change the deflection point during cutting.

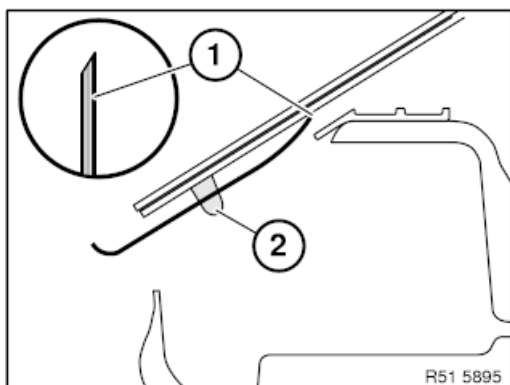
The suction cups without a spool can even be used as the deflection point.





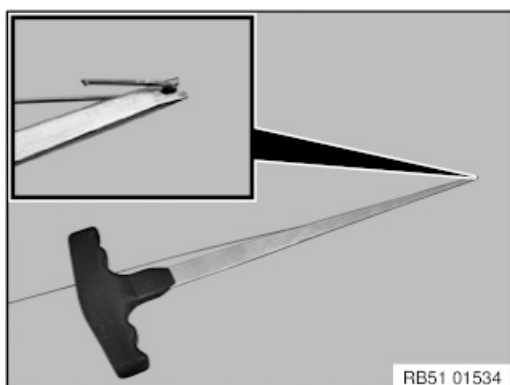
Preparatory work:

- Cut off required cutting wire length:
Length approximately = 6 x window glass diagonal
- The cutting wire loops must lie on top of each other in area (B).
They must not get caught up in each other. (Otherwise no possibility of cutting the adhesive bead/wire will break.)
Overlapping of cutting wire loops approx. 10 cm.
Distance from right window edge approx. 30 cm.



Pulling cutting wire into vehicle:

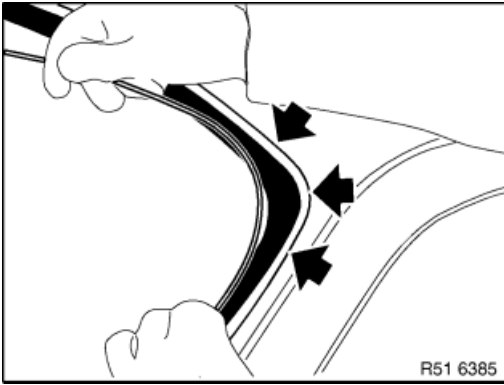
- Grip wire with pliers
(If accessibility is bad, stick wire with wire starter 2 150 267 through adhesive bead.)
- Wire end (1) must be bent towards window glass.
- Heat wire end (1) and use it to pierce adhesive bead (2).
- Pull the wire approximately 1.5 m into the passenger compartment



Using wire starter:

Bend wire end approx. 10 mm and insert in notched tip.
Pierce wire starter with uniform pressure through adhesive bead, wire end (bent part) must be positioned on window glass.





Laying cutting wire around window glass:

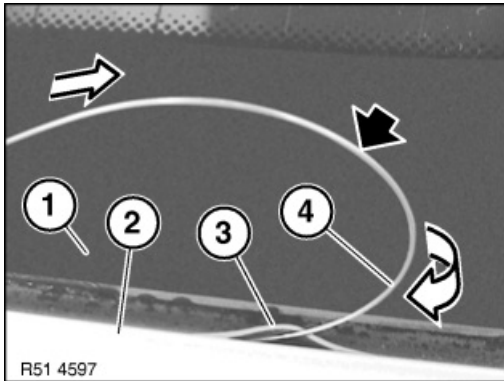
- Starting from pull-in point, lay wire eyelet created on the outside around the window glass
- Pull excess wire into passenger compartment

Important!

Make sure the cutting wire is located at all four corner points below the window glass.

Check that the cutting wire is not caught on clamps or body.

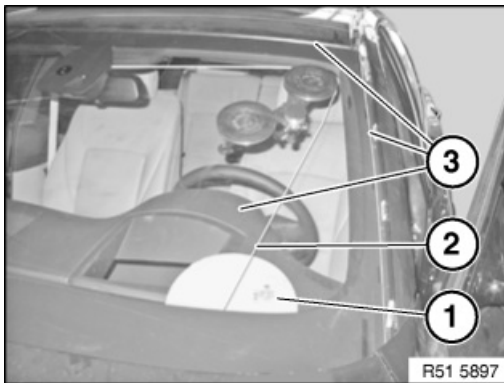
Secure window glass on outside with adhesive tape against sliding.



Note:

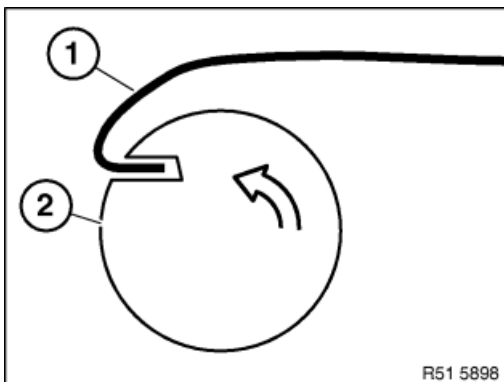
Window glass (1) with installed seals (3) or moulded-on surrounds:

- Moisten cutting wire (4) and seals (3) on window glass (1) with water
- Insert cutting wire (4) in bend (without kinking) between window glass(1) and body aperture (2)



Protect the passenger compartment:

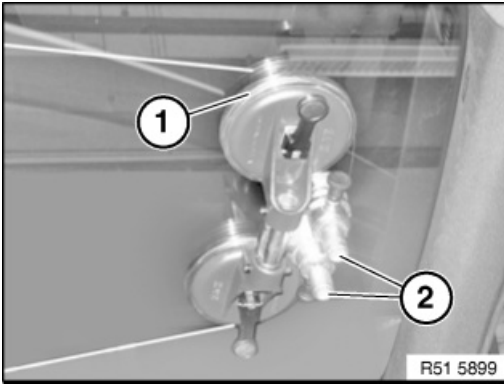
- To avoid damage and possible dirt contamination, protect A-pillars, roof and dashboard trim panel (3) by means of plastic washer (1)
- Always carry plastic washer (1) between respective wire (2) being tightened and trim panels



Attaching wire in hoisting winch with double coil:

- Bend over cutting wire end (1) approximately 10 mm and insert into slot of spool (2)
- Repeat process with other end of wire (1) and second spool (2)
- Wind cutting wire (1) onto spools by hand until cutting wire (1) is under slight tension





Starting the dismantling: *Note:*

Spools can only be rotated in one direction.

- Make sure the wire is always situated in the guide channel of the suction cup lifter (1)
- Fit reversible ratchet onto top spool shaft (2) and tighten wire
- Start by cutting lower adhesive bead
- At the end of the cutting process, the two wire loops join up at the lifting winch (1)
- Remove "Roll Out 2000"
- Remove window glass



**Attention!**

The following notes form the basis for these repair instructions and must be adhered to at all times:

- Notes on window bonding
- General procedure for dismantling/installation of affixed window glass



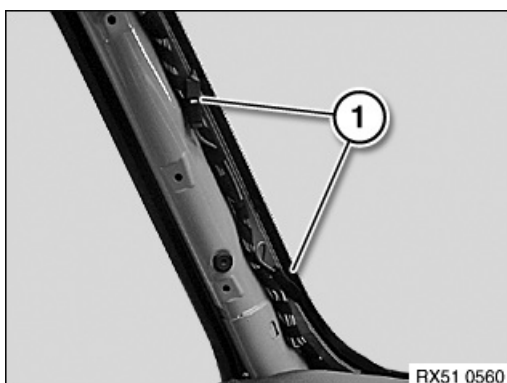
Removal is performed with Roll Out 2000.

The following new parts/consumable are required (sourcing reference BMW Group Parts).

Material	Quantity
Windscreen (replacement)	1
Spacer buffer	2
Small repair kit	1

**Necessary preliminary work:**

- Remove left cowl panel cover
- Remove cover on A-pillar (outside) on left and right.
- Remove trim panels for roof pillar at front
- Remove sun visors
- Remove the roof operating facility
- Remove inside mirror
- Remove rain/light sensor

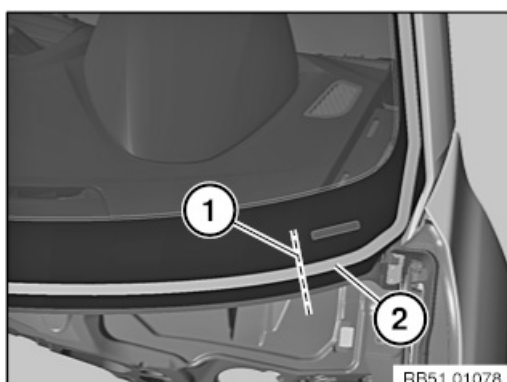


Disconnect plug connection (1).

Secure cable with adhesive tape to windscreen.



Pay attention to cable when cutting in this area.



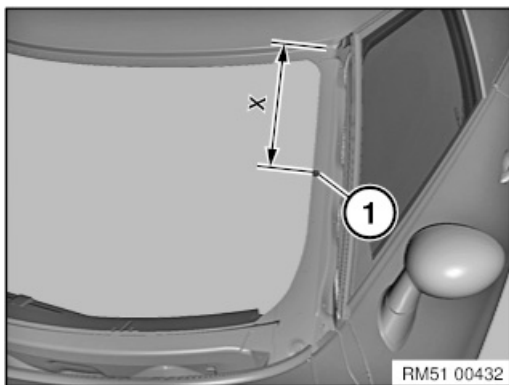
Tape off body in area of piercing point with fabric adhesive tape.

Push wire from Roll Out 2000 along line (1) through adhesive bead (2).

For details on how to proceed, refer to: Window Removal with "Roll Out 2000".

Lift out windscreen with suction cup.





Fitting spacer buffers (spacers):



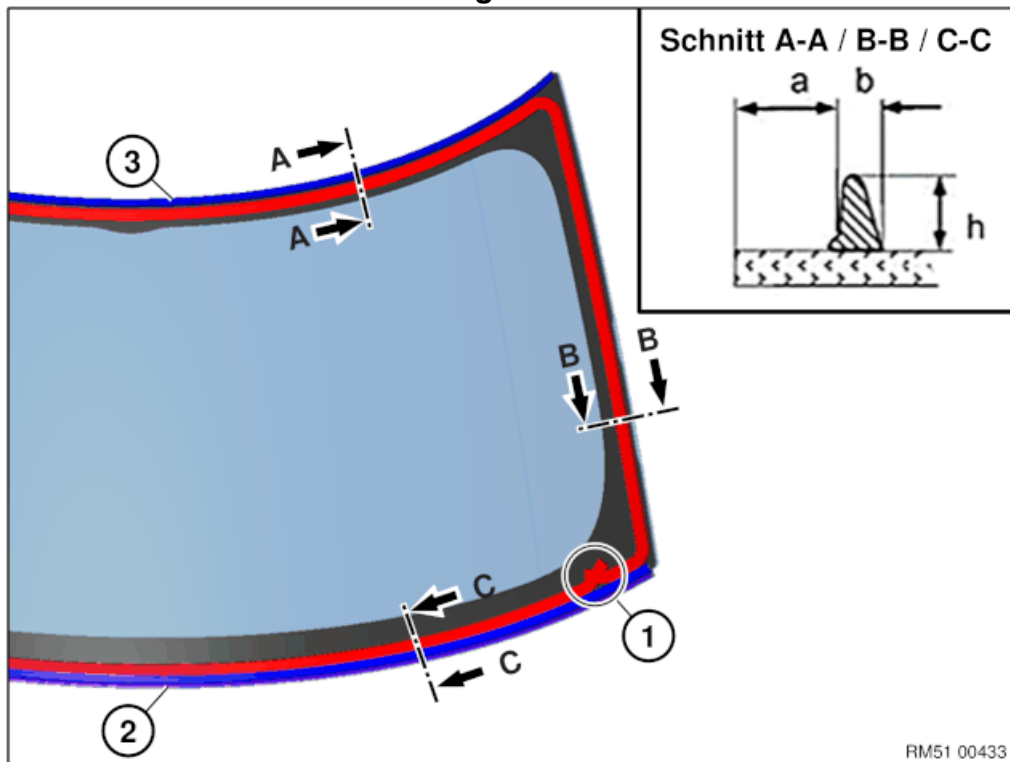
Spacer buffers are installed left and right on the A-pillar to avoid windscreen breakage and wind noises.

Completely remove the damaged spacer buffers (1).

Position and bond a spacer buffer (1) in accordance with dimension (x).

$x = 295 \text{ mm}$

Overview of windscreen bonding:



1 = adhesive bead joint

2 = retaining strip

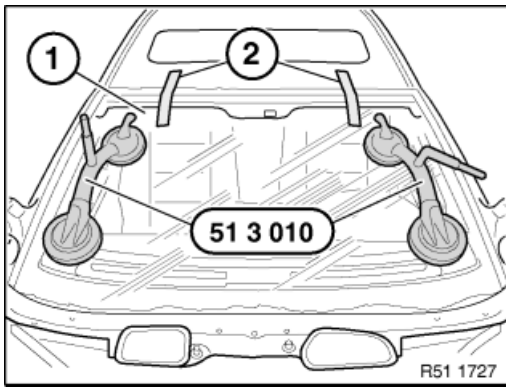
3 = cover of windscreen, top

If necessary, mount new retaining strip (2) and top windscreen cover (3), paying attention to centre markings in the process.

Insert positioner for retaining strip must be removed after it has been fitted on the windscreen but before the windscreen itself is installed.

Cut	A - A	B - B	C - C
a [mm] = Position adhesive bead	5 ± 1 (for sealing on top)	10 ± 1 (for outer edge of windscreen)	5 ± 1 (for bottom retaining strip)
b [mm] = Width adhesive bead	$7 \pm 1^*$		
h [mm] = Height adhesive bead	$11 \pm 2^*$		
* Corresponds to nozzle C (standard adhesive bead)			





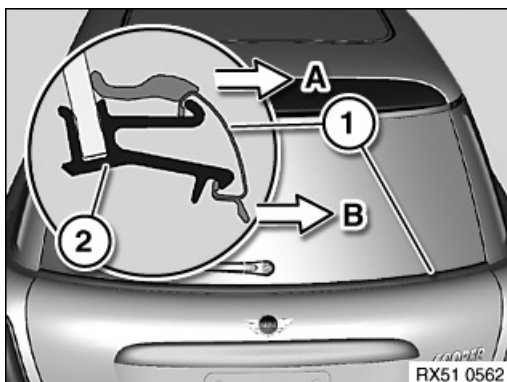
Perform the following steps carefully on the windscreen (1) using suction cup (51 3 010):

- Position at top
- Align sides evenly
- Insert at bottom and press down
- press upwards until sealing rests evenly on roof
- secure in terms of height in this position at top with two yellow plastic adhesive tapes (2)

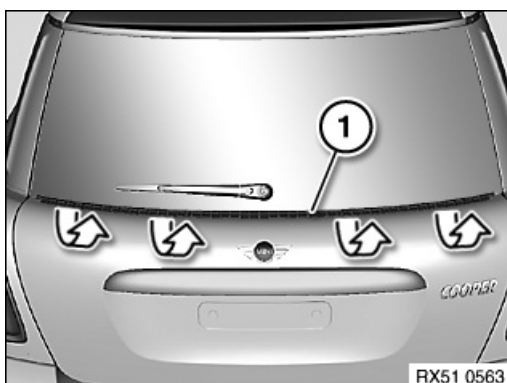


Initialise rain sensor





Unclip trim strip (1) first at top (A) then at bottom (B) from retaining strip (2).



Installation note:

Retaining strip (1) must not be damaged.

If necessary, remove and replace retaining strip (1).

To facilitate installation, moisten retaining strip (1) with water.



**Special tools required:**

- 51 3 010
- 00 9 322

**Important!**

Instructions for window bonding are an essential part of these repair instructions and must be followed without fail.

ALL the sheet metal panels and add-on parts adjoining the rear window must be fitted with protective covers.

Note:

Removal is carried out with Roll Out 2000; only use an oscillating blade for replacement work.

**Necessary preliminary work:**

- Remove rear spoiler
- Remove rear window wiper motor
- Remove lower cover on rear window

*Note:*

Disconnect diversity plug connection.

Disconnect heated rear window plug connection and secure to rear window with adhesive tape.

Replacement (broken rear window):

Cut at top and bottom with a straight blade and at sides with U-shape blade.

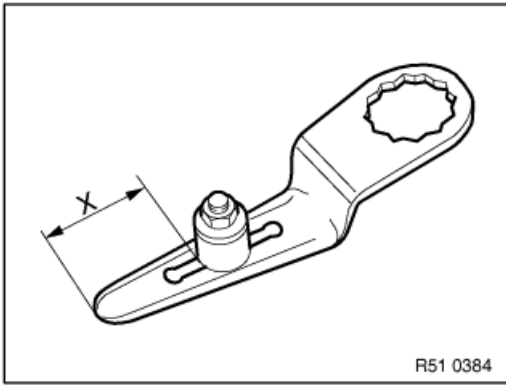
**Important!**

When reusing the rear window:

Avoid damaging wires for heated rear window/aerial.

Cut through adhesive bead all round and as closely as possible to rear window.





Replacement (broken rear window):

Fit straight blade with adjustable roller (Sourcing Reference: BMW Parts Department) on tool and set dimension (X).

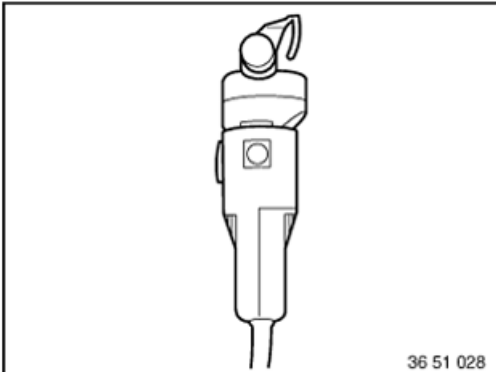
Adjust dimension (X) differently according to different position of adhesive bead.

Dimension "X":

Top 22 mm

Bottom 18 mm

Regind blade with a grinding stone while machine is running (new blades also).



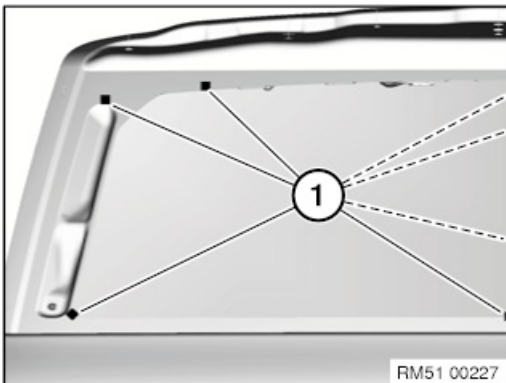
Close rear lid.

Attach a 36 mm U-shape blade (sourcing reference: BMW Parts Department) to tool.

Regind blade with a grinding stone while machine is running (new blades also).

Insert knife carefully between tailgate and rear window.

Guide blade parallel to rear window and cut through adhesive bead as closely as possible to rear window.



Fitting 7 spacer buffers (spacers):

Installation positions for spacer buffers (1) are marked on sheet metal flange.

Spacer buffers (1) must be mounted centrally so that they cover the embossed marks on sheet metal flange (part number 7 061 285 *).

* Sourcing reference: BMW Parts Department

Important!

To avoid rear window breakage and leaks:

Completely remove remnants of removed spacer buffers and maintain installation location exactly.



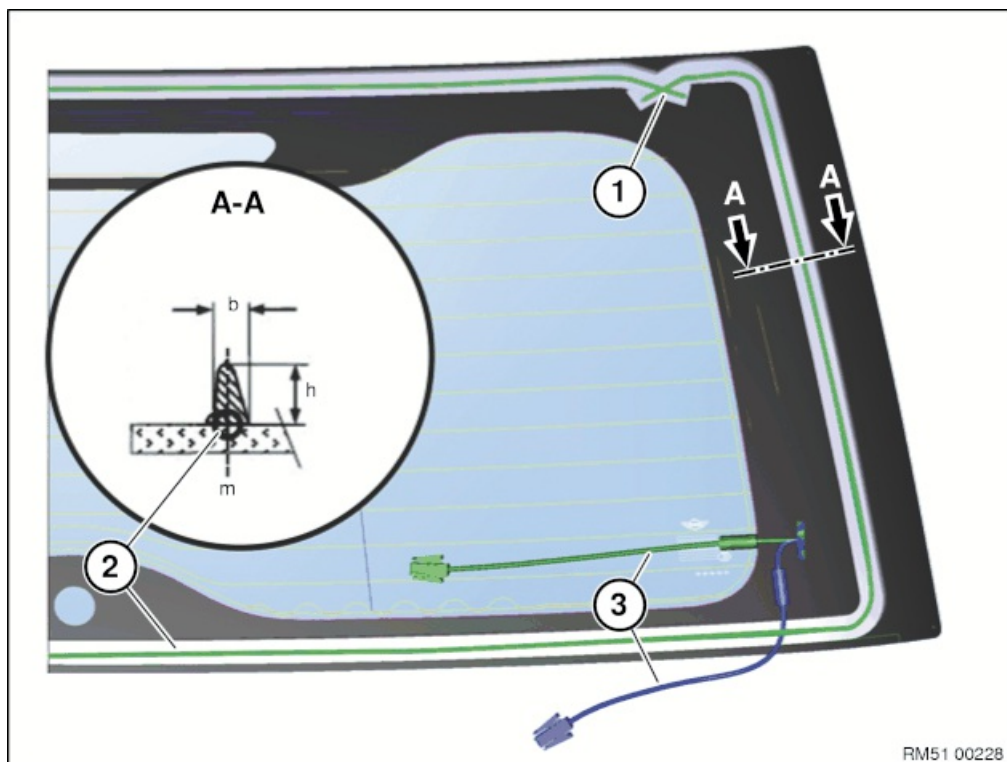
Important!

Version with rear window aerial:

Do not allow any adhesive to come into contact with the connecting contacts of the heated rear window/aerial.

Overview of rear window bonding (R60):





RM51 00228

1 = adhesive bead joint

2 = mark on ceramic layer (position of adhesive bead)

3 = plug connections (diversity, heated rear window)

Cut	A - A
m = position of adhesive bead	Centrally aligned with mark (2) on ceramic layer (window glass)
b [mm] = Width adhesive bead	$7 \pm 1^*$
h [mm] = Height adhesive bead	$11 \pm 2^*$
* Corresponds to nozzle C (standard adhesive bead)	

Attach special tool 51 3 010 twice to tool trolley. Moisten suction faces and secure rear window from outside. If reusing removed rear window, remove residual adhesive down to 0.5 mm.

Spread bead joint with special tool.00 9 322



Note:

Bonding surfaces for yellow plastic adhesive tapes must be free from grease and dust.

Attach two pieces of yellow plastic adhesive tape to surface of tailgate over rear window at a distance of 250 mm to outer corners.

Make sure tailgate is fully closed.

Carefully working on rear window with special tool 51 3 010 :

- position at bottom on tailgate
- Align sides evenly
- insert at top and press down
- secure vertically with yellow plastic adhesive tape





Note:

Do NOT open tailgate before adhesive has hardened.

Reassemble the vehicle.

Remove adhesive tape strips after the hardening time.



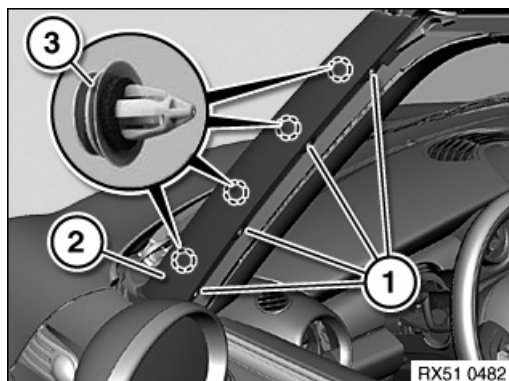
51 31 045 left or right

Removing and installing/replacing trim cover on A-pillar (outer),



Necessary preliminary work:

- Remove trim strip from side panel



Note:

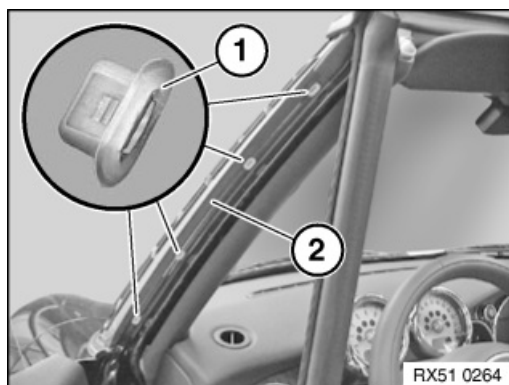
Graphics originate from R56 .

Release screws (1).

Release trim (2) at clips (3) and remove.

Installation note:

If necessary, replace faulty clips (3).



Installation note:

If necessary, replace faulty nut inserts (1) on A-pillar (2).



51 31 ... Removing windows with a "Spider"

Windscreen removal system "Spider"



- | | |
|------------------------------|---------------------------------------|
| 1 "Spider" separation device | 6 Line threader |
| 2 Bit holder | 7 Line routing tool |
| 3 Operating instructions | 8 Suction anchor |
| 4 Dashboard protection | 9 Cord for separating adhesive strips |
| 5 Angular transmission | |

Accessories required for operation (not included):

Cordless screwdriver/drill with at least a 10.8 V Li-ion battery or a 18 V Ni-Cd battery and variable speed.

Note: Always use a low gear setting.



Note:

Damage as well as ergonomic and health-endangering damage are minimised with the "Spider" disassembly system.

Sourcing reference:

See Aftersales Assistance Portal (ASAP) - Service/Technical - Workshop Equipment (Start BMW) - Shop Workshop Equipment or at www.bmwgroup.com



Warning!

Follow safety instructions for working on vehicles with airbag systems (risk of injury).

Important!

Handle sharp-edged tools with care (risk of damage to the head airbag and the window glass).





Important!

Always keep both suction cups dry and clean to ensure their optimum adhesion on the windscreen.

Suction cup may not be applied at the damaged point (crack in window glass).

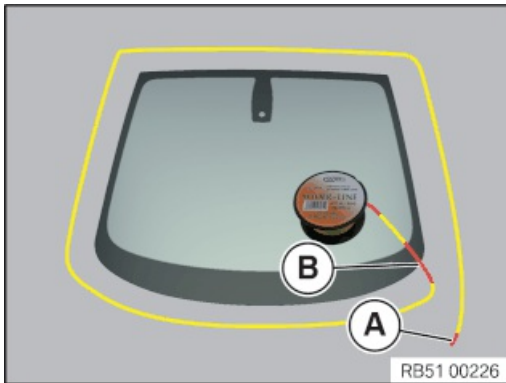
The bearing bushes of the shaft (spindle) must always be lubricated.

Always wear safety goggles and protective gloves for your own safety.



The procedure for disassembly of the windscreen is described below as an example.

Deviations in the work procedure can be found in the vehicle-specific repair instructions.



General

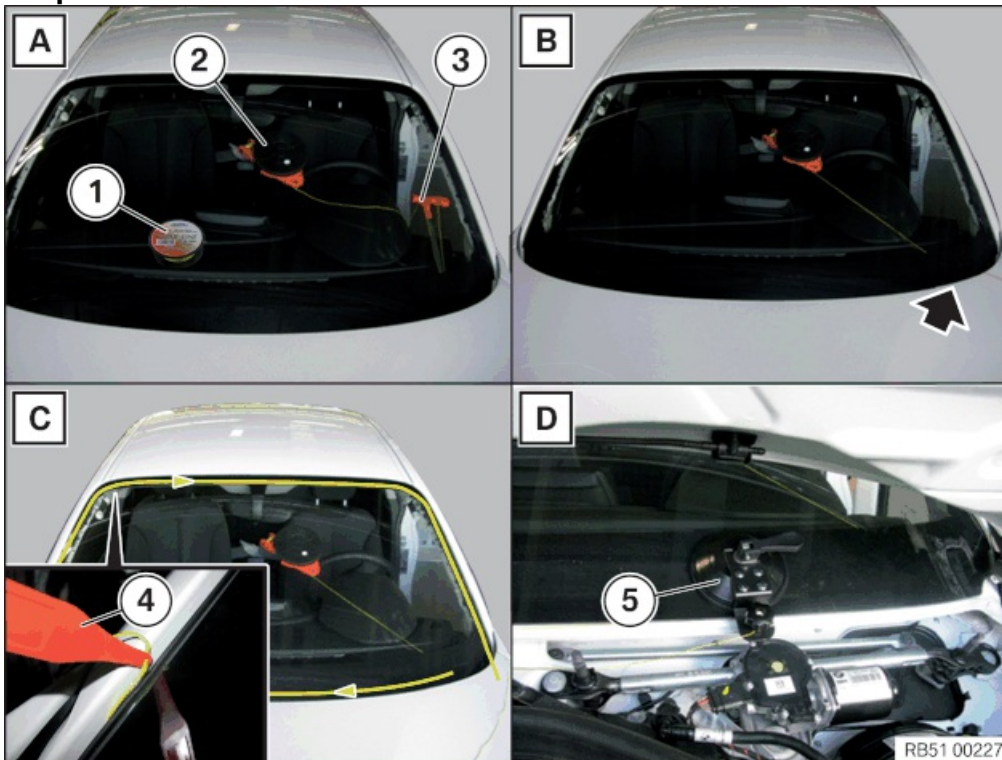
A cord approx. 6.8 m long is used to cut through the adhesive bead.

The cord length to be used is identified by a short red mark (A) approx. 5 cm.

The part of the cord laid outside around the window glass (approx. 5 m) is identified with a long red mark (B) (approx. 18 cm).

The marks are applied so that the cord has to be pulled from the inside to the outside.

Preparation



A. Pierce cord from the roller (1) or separation device (2) with cord threader (3) through the adhesive bead from the inside, protect the area from the inside as required.

B. Pull out cord up to the first red mark (approx. 18 cm long).

C. Lay cord around the window glass, use pulling aid (4) if required.

D. Secure suction anchor (5) outside on window glass, secure cord to suction anchor (5).

If required, unwind cord from roller (1) up to the second red mark (approx. 5 cm long) and cut off.



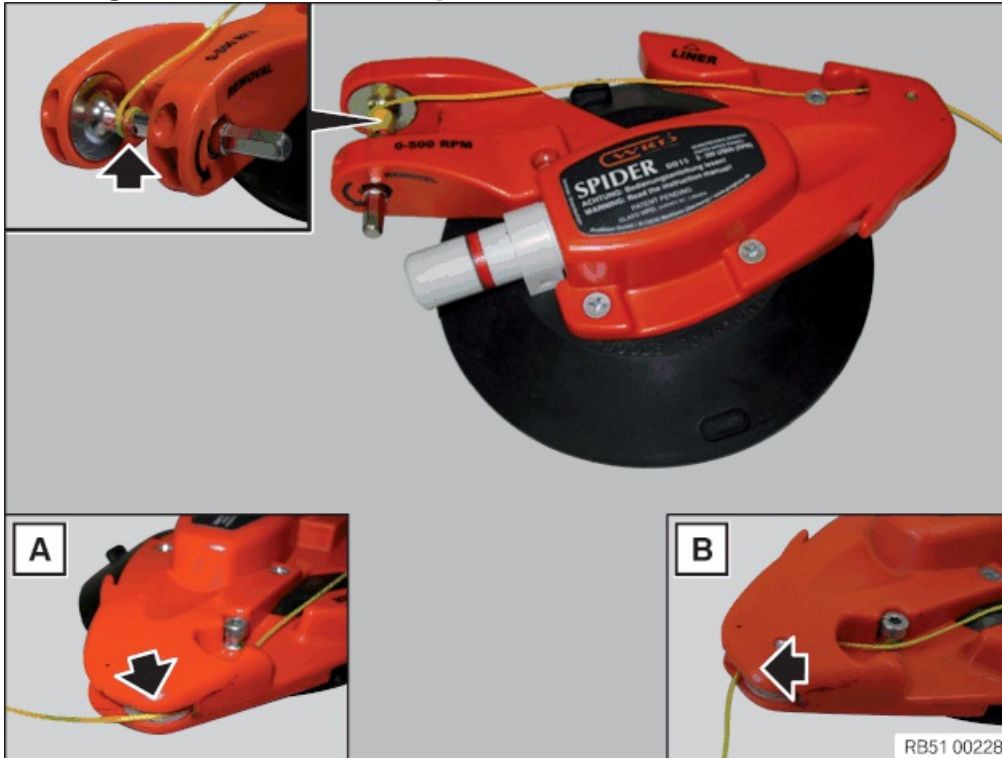


Make sure the cord lies below the window glass at all four corners.

Check that the cord is not caught on clamps or body.

Secure window glass on outside with adhesive tape against sliding.

Feeding in the cord on the separation device



Normally, the adhesive bead is cut through anticlockwise seen from the passenger compartment.

- This means the cord must be fed into the separation device as shown in graphic A.

When accessibility is not optimal, the opposite cutting direction may be required (comply with vehicle-specific repair instructions).

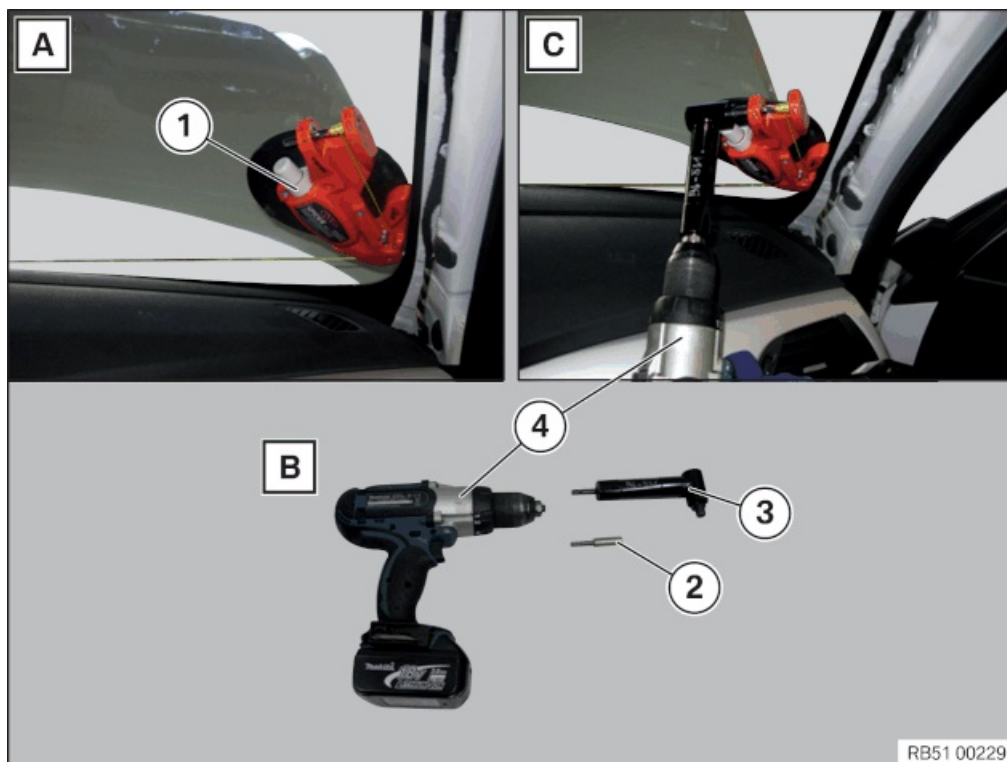
- This means the cord must be fed into the separation device as shown in graphic B.


Feed cord into coil and wind it on, at the same time trapping the end of the cord.

When winding the cord, the correct direction of rotation on the separation device must be observed.

Cutting out procedure





 Optimum cutting is guaranteed when the cord is at an acute angle to the adhesive bead. There is a risk of the cord ripping if the angle is too obtuse.

The separation device must be positioned correspondingly to achieve the appropriate angle.

- A. Fix separation device (1) on window glass at bottom right.
- B. Depending on accessibility, attach bit holder (2) or angle gear (3) to cordless screwdriver (4).
- C. Place cordless screwdriver (4) on separation device (1) and start winding cord, observe direction of rotation on separation device.

If required, over trim panel components with plastic protection.

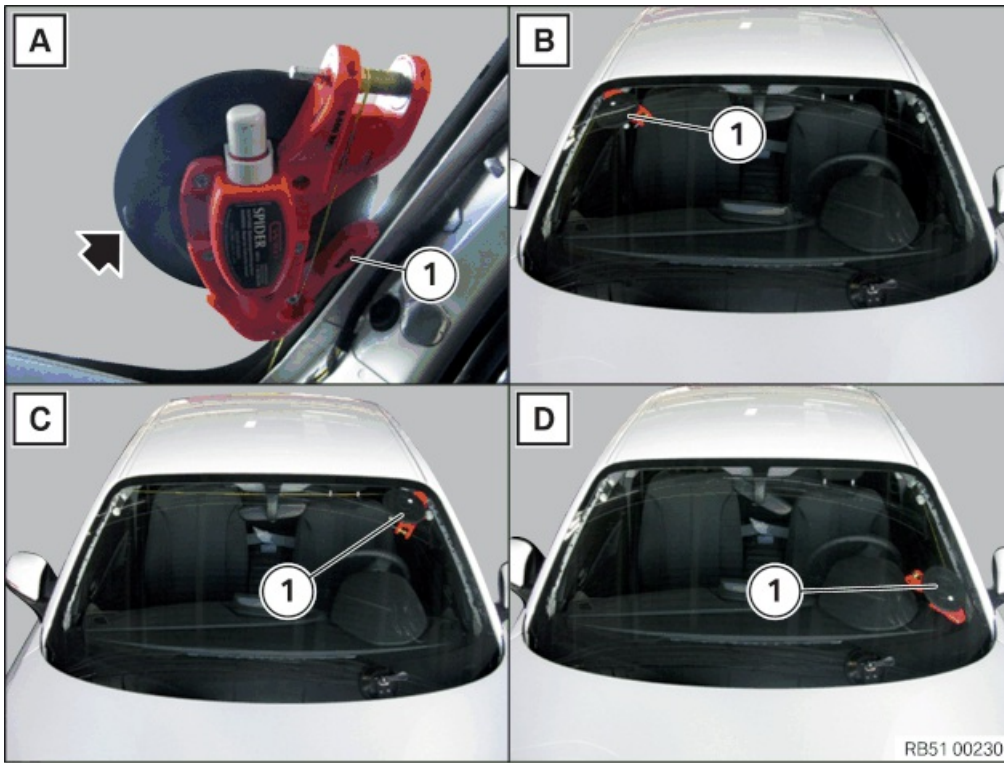
Guide cord with plastic protection around sharp-edged positions.

Cut through adhesive bead up to bottom area of A-pillar.

Turn back cordless screwdriver (4) approx. 2 rotations and remove.

Cutting out procedure





- A. Discharge vacuum on windscreen removal tool (1) by pressing the tab, remove windscreen removal tool (1) from window glass.
- B. Reset removal tool (1) at illustrated and wind up cord up to the position of windscreen removal tool (1).
- C./D. Repeat further resetting, work sequence as given at B.

Additional resetting may be required for very curved window glass.



It is possible to reuse the cord. When a cord is used many times the risk of ripping increases.
Dirt contamination must be avoided when a cord is reused.



51 31 ... Removing windows with an oscillating knife



Warning!

Follow safety instructions for working on vehicles with airbag systems (risk of injury).

Important!

Handle sharp-edged tools with care (risk of damage to the head airbag and the window glass).



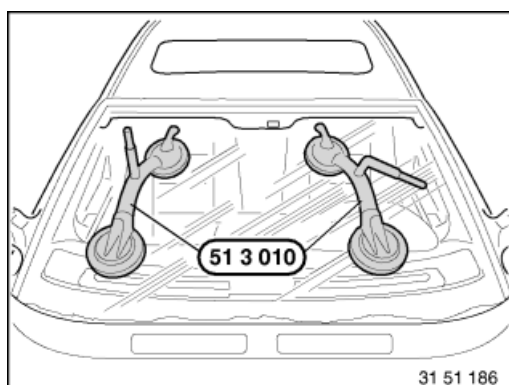
Important!

Follow the vehicle-specific repair instructions!

Always wear safety goggles and protective gloves for your own safety.

Cover the working area (side walls, roof-mounted aerial and if necessary interior equipment) with protective covers.

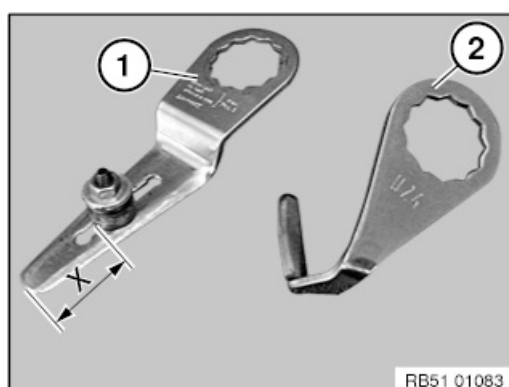
Tape off body with fabric adhesive tape (e.g. Tesa) in areas where the oscillating knife could damage the window glass or the paint.



Use suction cups (51 3 010) to lift out the window glass.

Always keep both suction cups dry and clean to ensure their optimum adhesion on the windscreen.

Secure window glass against falling out.



Depending on the area of application, knife 1 or 2 is used.

(1) Straight knife with adjustable thrust roller

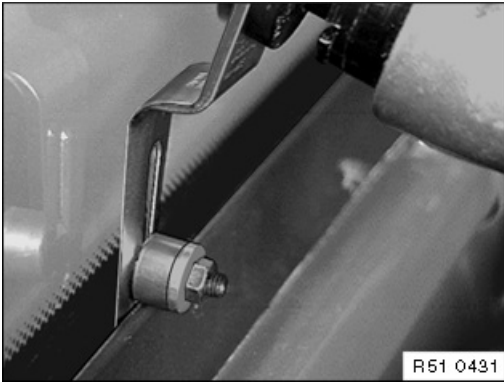
(2) U-shaped knife

Dimension (X) on the knife (1) can be adjusted individually, see vehicle-specific repair instructions.

Note:

Sharpen knife blade before every use on a running machine with a grinding stone (even with new knife blade).





Removing from the inside:

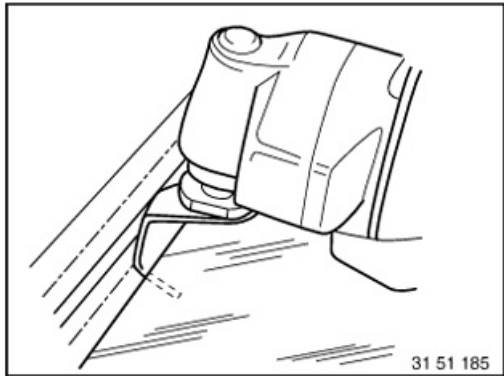
Guide knife carefully between body and window glass.

Run blade of knife parallel to glass.

Take care not to damage paintwork.

Cut through adhesive bead all the way around.

Pull window glass outwards to remove.



Removal from outside:

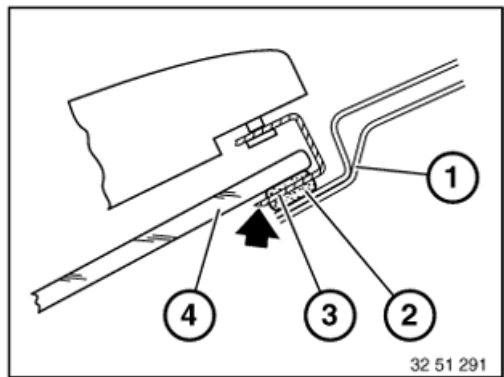
Guide knife carefully between body and window glass.

Run blade of knife parallel to glass.

Take care not to damage paintwork.

Cut through adhesive bead all the way around.

Pull window glass outwards to remove.



Cut through adhesive bead as closely as possible to window glass.

- (1) Body opening
- (2) Adhesive bead
- (3) Knife
- (4) Window



51 31 ... Window glass removal with wire pull handle



Special tools required:

- 2 150 267



Warning!

Follow safety instructions for working on vehicles with airbag systems (risk of injury).

Always wear safety goggles and protective gloves for your own safety.

Attention!

Handle sharp-edged tools with care (risk of damage to the head airbag and the window glass).



Attention!

Follow the vehicle-specific repair instructions!

Protect inner and outer working area (body, trim panels, cables etc.) against damage.



Depending on the area of application, a separating cord can also be used as an alternative to wire.

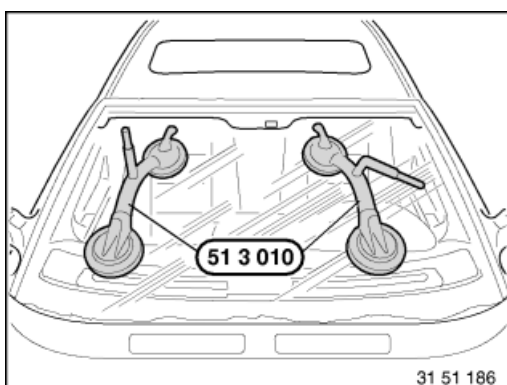
Using the separating cord prevents any damage to the body.

Do not pull the separating cord over any sharp edges (risk of tearing)!



Used tool:

- Wire pull handles
- Dashboard protection
- Wire starter (special tool 2 150 267)

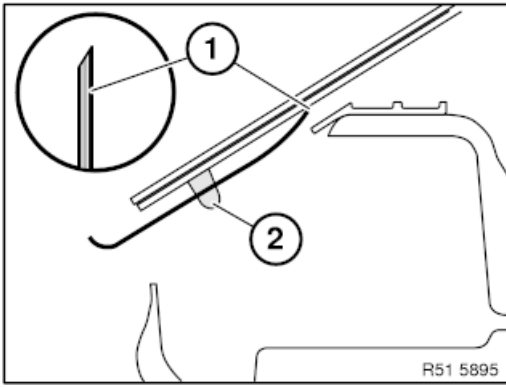


Use suction cups (51 3 010) to lift out the window glass.

Always keep both suction cups dry and clean to ensure their optimum adhesion on the windscreen.

Secure window glass (if necessary with adhesive tape) against falling out.



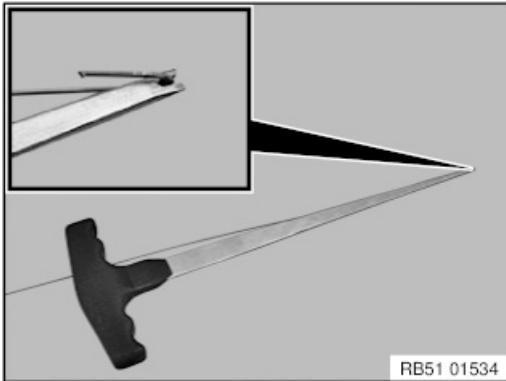


Pulling cutting wire into vehicle:

- Grip wire with pliers
(If access is difficult: using wire starter 2 150 267 , feed wire through adhesive bead.)
- Wire end (1) must be bent towards window glass.
- Heat wire end (1) and use it to pierce adhesive bead (2).
- Pull approximately half of the wire into the passenger compartment

Note:

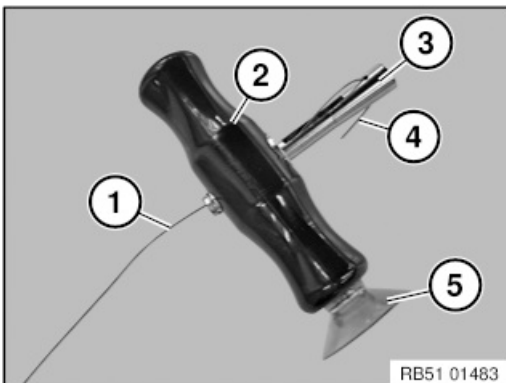
When using the separating cord, always pull it in using the wire starter 2 150 267 .



Using wire starter:

Bend wire end approx. 10 mm and insert in notched tip.

Pierce wire starter with uniform pressure through adhesive bead, wire end (bent part) must be positioned on window glass.



Attach wire pull handles:

Feed in cutting wire (1) in cutting handle (2) and clamping element (3) as illustrated.

Move back cutting handle (2) over clamping element (3) and trap wire end (4).

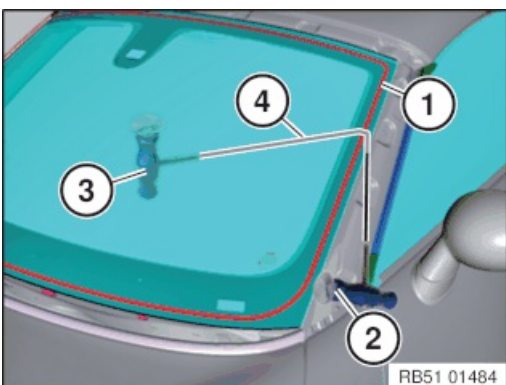


Danger of injury!

Wire end (4) must not protrude out of cutting handle (2).

Cutting handle (2) can be secured with suction cup (5) to the vehicle window or body during each of the work operations. This prevents damage to the paint.

Fit second wire pull handle to other wire end.



Perform repair work with the aid of a second person.

Cutting wire (4) must be guided in cutting direction at an acute as possible angle (>45°) to adhesive bead (1).

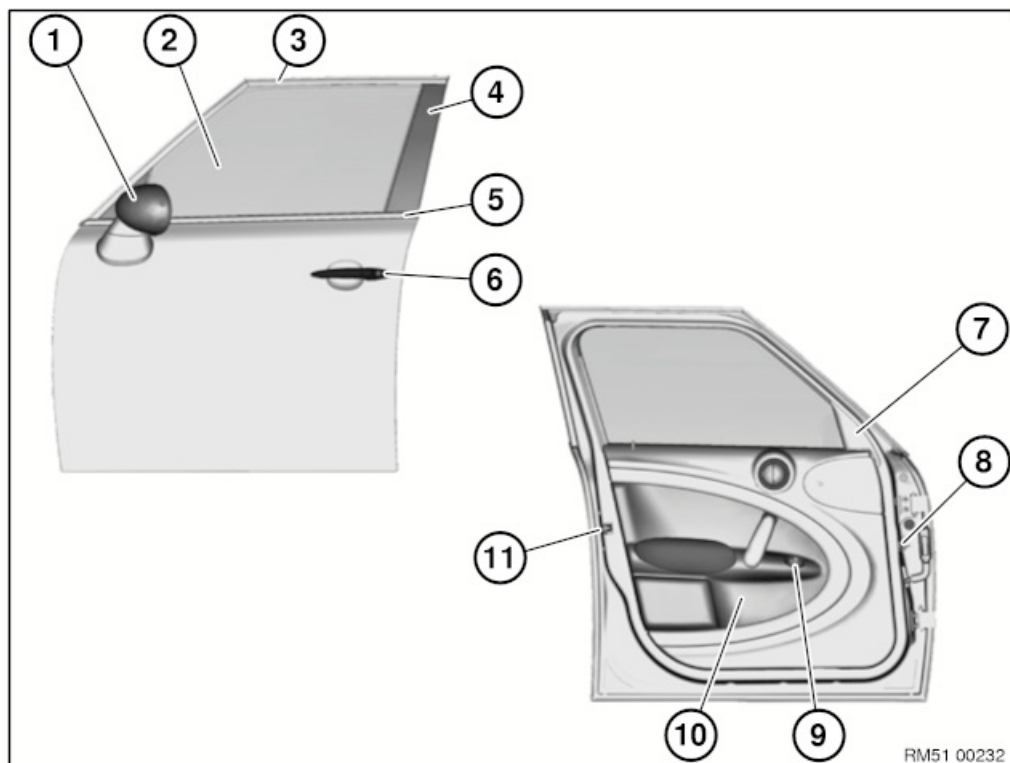
Cut through adhesive bead (1) by pulling cutting handle (2) and at the same time providing counter support with cutting handle (3).

Pull back cutting wire (4) with cutting handle (3) and make sure that cutting wire (4) is always held under tension.

Cut through remaining adhesive bead in the same way.



51 00 .. Overview of front door



- | | |
|--------------------------------------|--|
| 1 Exterior mirror | 7 Cover on window frame (see rubber window seal for door window) |
| 2 Door window glass | 8 Door brake |
| 3 Rubber guide for door window glass | 9 Switch for exterior mirror/power window regulator |
| 4 Trim on window frame | 10 Door trim panel |
| 5 Window cavity cover strip | 11 Door lock |
| 6 Outer door handle | |



51 32 420 Removing and installing/replacing cover on window frame (B-pillar) of front door, left or right

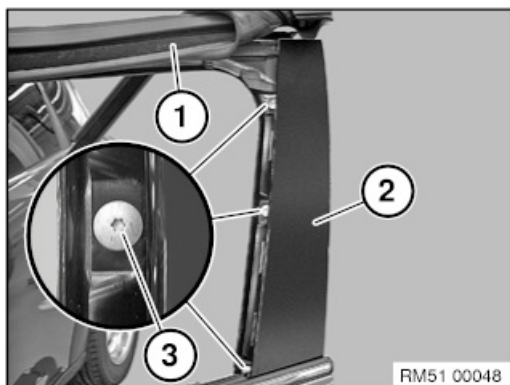


Necessary preliminary tasks:

- Completely open side window if necessary



Work shown on the R60 by way of example, deviations in detail are possible in other models.

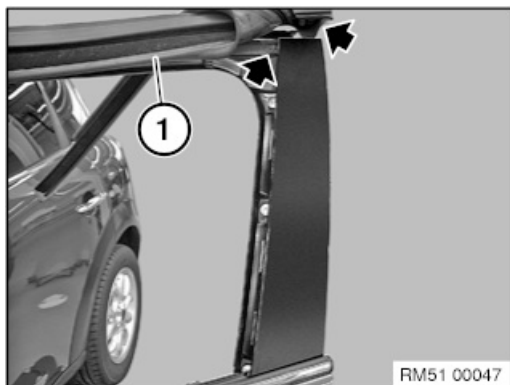


Feed out rubber window seal (1) toward the top as shown.

Release screws (3) from window frame cover (2).

Tightening torque 51 33 5AZ.

Pull out window frame cover (2) toward the top.



Installation note:

To facilitate installation, moisten rubber window seal (1) slightly with water.

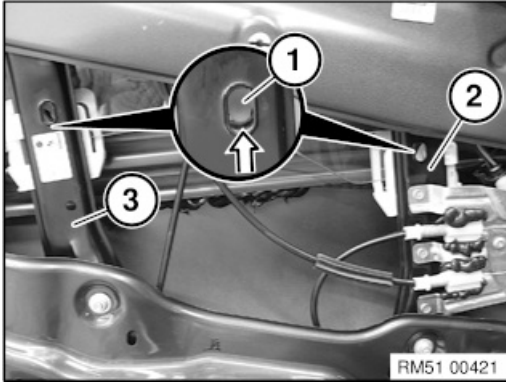
Feed in rubber window seal (1) correctly at the angle of the window frame.





Necessary preliminary tasks:

- Remove weather strip
- Remove sound insulation



Electrically move the door window glass until the brackets (1) are accessible via the opening on the window guide rail (2 and 3).

Press the brackets (1) toward the outside with a suitable tool and feed the door window glass out in upward direction.

Tilt door window forward and lift out of the door toward the top.



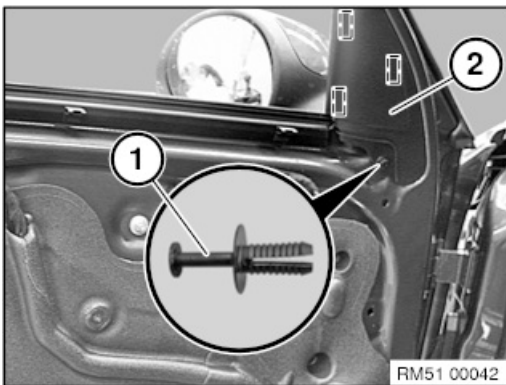


Necessary preliminary tasks:

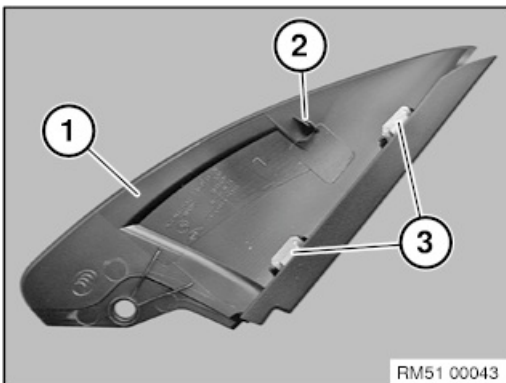
- Remove weather strip
- Remove door trim panel



Repair work shown on the R60 by way of example, deviations in detail are possible in other models.

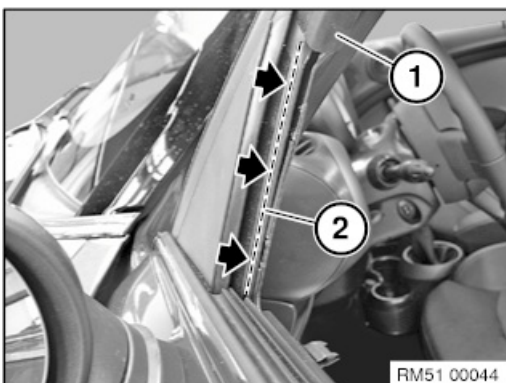


Release expanding rivet (1) from window frame cover (2).
Clip out window frame cover (2) towards rear.



Installation note:

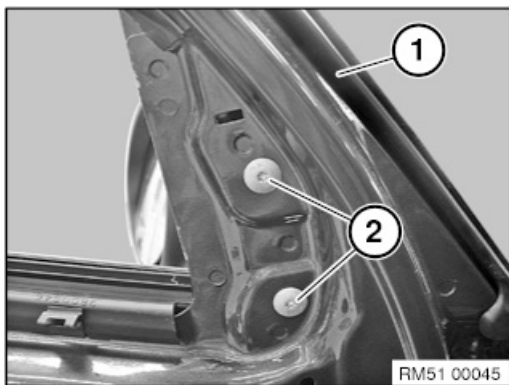
Hooks (2) and retaining clips (3) of window frame cover (1) must not be missing or damaged.



Installation note:

Feed window frame cover correctly into groove (2) of rubber window seal (1).

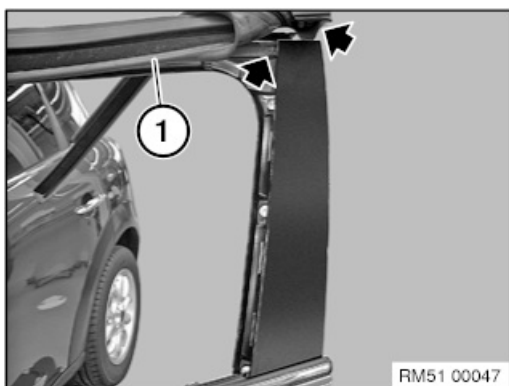




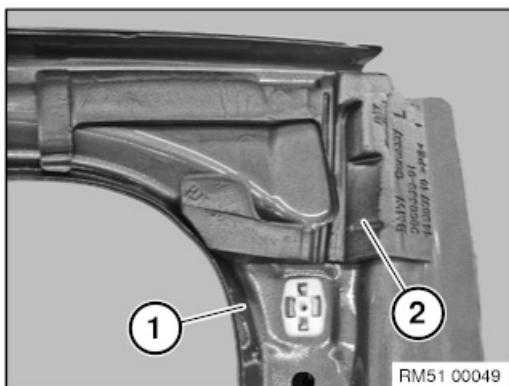
Release screws (2) of rubber window seal (1).
Tightening torque 51 33 4AZ.



Feed out rubber window seal (1) beginning at the front. *Installation note:*
To facilitate installation, moisten rubber window seal (1) slightly with water.

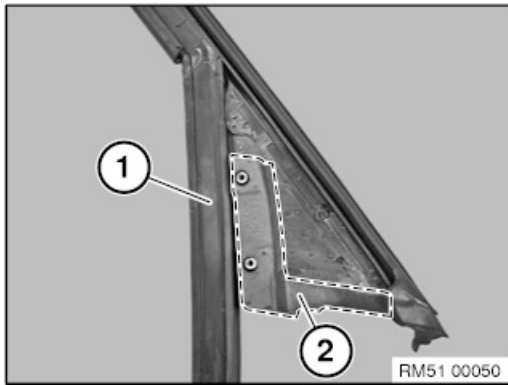


Installation note:
Feed in rubber window seal (1) correctly at the angle of the window frame.



Installation note:
Sealing (2) on rubber window seal (1) must not be missing or damaged.





Installation note:

Sealing (2) on window frame (1) must not be missing or damaged.



51 33 000 Remove and install the power window regulator in the left or right front door

PRELIMINARY WORK

1 – Removing the handle recess in the front door trim panel

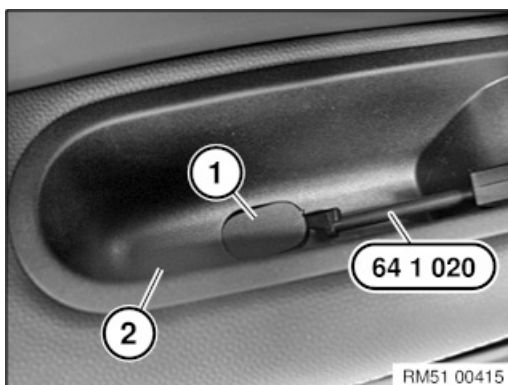


RISK OF DAMAGE

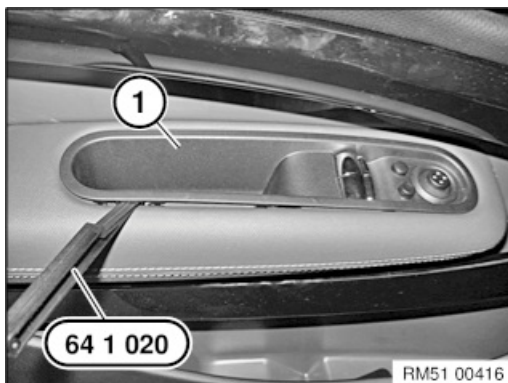
Scratches.

Tools and sharp-edged components can cause scratches.

- Protect working area.
- Handle tools and components carefully.



- Unclip the cover (1) using special tool [0 496 569 \(00 9 325\)](#) from the handle recess (2).
- Release screw underneath.



- Start at the rear and unclip the handle recess (1) using special tool [0 496 569 \(00 9 325\)](#).
- Disconnect the associated plug connection and remove the handle recess (2).

2 – Removing the front door trim panel on the left or right (up to 11/2012)



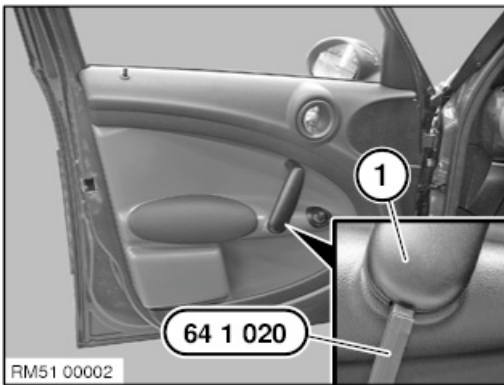
RISK OF DAMAGE

Scratches.

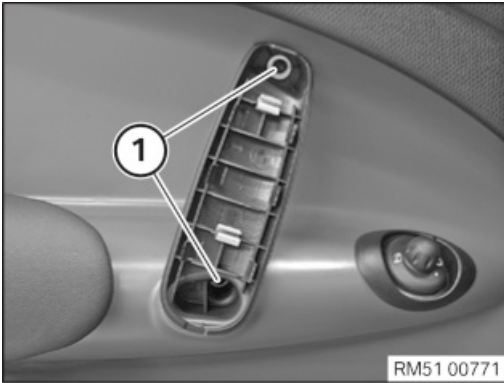
Tools and sharp-edged components can cause scratches.

- Protect working area.
- Handle tools and components carefully.

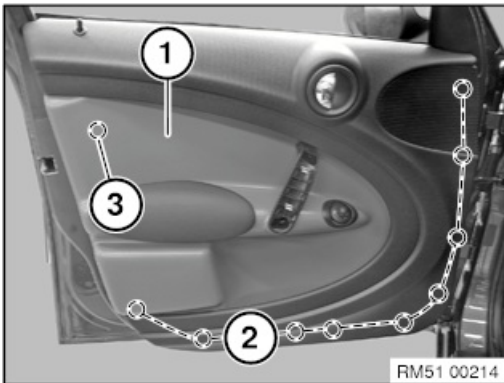




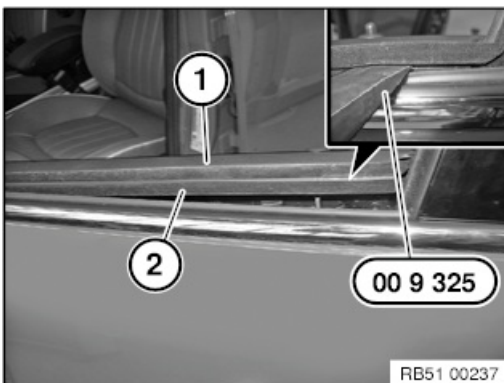
- Lever off and remove cover (1) on the door handle with the special tool [0 493 681 \(64 1 020\)](#).



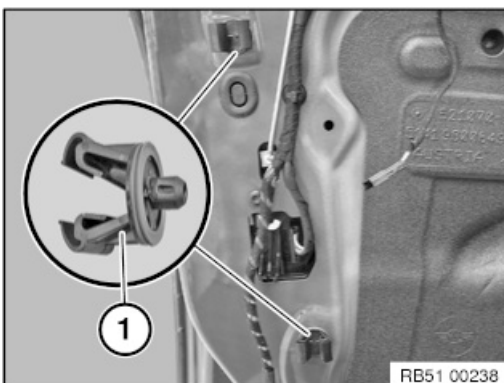
- Loosen screws (1).



- Unclip the door trim panel (1) at the marked positions (2) with the special tool [0 496 569 \(00 9 325\)](#).
The clip (3) is unclipped from the door trim panel and remains on the inner door panel.



- Completely open the window glass.
- Lever out the [0 496 569 \(00 9 325\)](#) door trim panel (1) including the weather strip (2) upward from outside with the special tool.

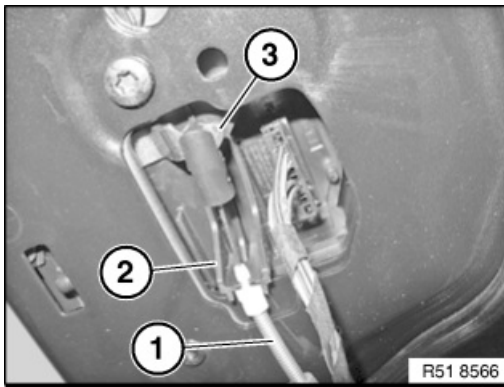


NOTICE

For a better overview the removed condition is shown here.

- Lever up the door trim panel till the door trim panel is released from the upper and lower clip (1).





- Detach the Bowden cable (1) of the inside door handle at the counter support (2).
- Detach the Bowden cable (1) of the inside door handle at the door lock (3).
- Unlock all plug connections and disconnect.
- Unclip the vehicle wiring harness at the door trim panel.
- Remove door trim panel.

3 – Removing the front door trim panel on the left or right (from 11/2012)

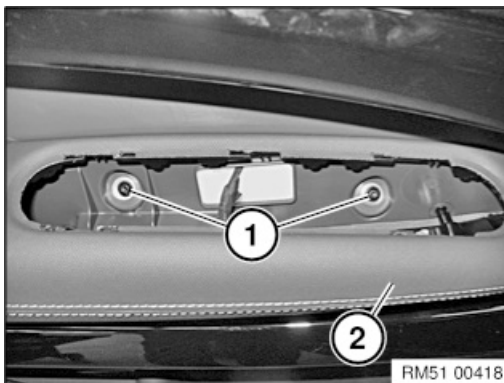


RISK OF DAMAGE

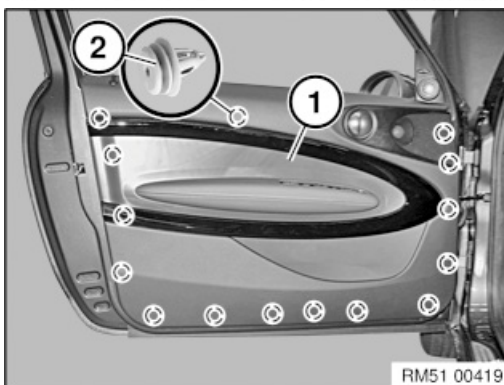
Scratches.

Tools and sharp-edged components can cause scratches.

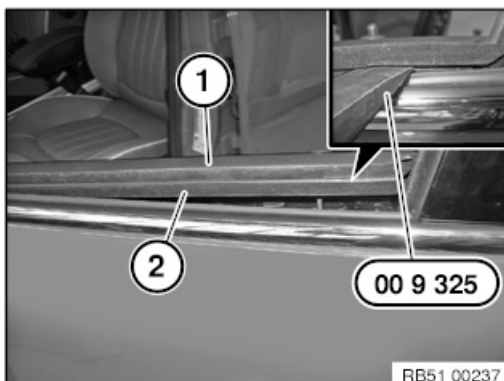
- Protect working area.
- Handle tools and components carefully.



- Release screw (1) from the door trim panel (2).

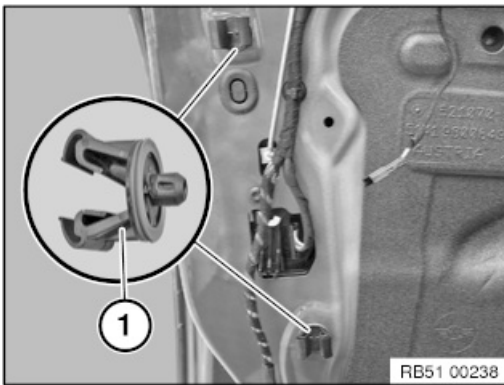


- Release the door trim panel (1) with the special tool [0 496 569 \(00 9 325\)](#) from the clips (2).



- Completely open the window glass.
- Lever out the [0 496 569 \(00 9 325\)](#) door trim panel (1) including the weather strip (2) upward from outside with the special tool.

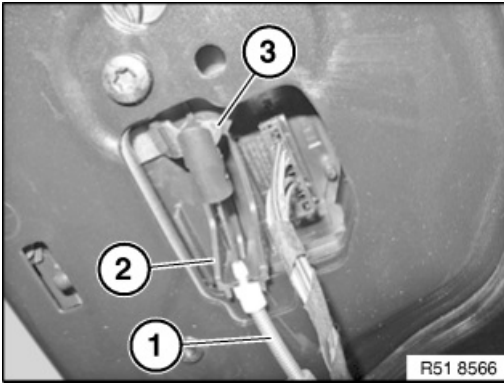




NOTICE

For a better overview the removed condition is shown here.

- Lever up the door trim panel till the door trim panel is released from the upper and lower clips (1).
- Detach the Bowden cable (1) of the inside door handle on the counter support (2).
- Detach the Bowden cable (1) of the inside door handle at the door lock (3).
- Unlock all plug connections and disconnect.
- Unclip the vehicle wiring harness at the door trim panel.
- Remove door trim panel.



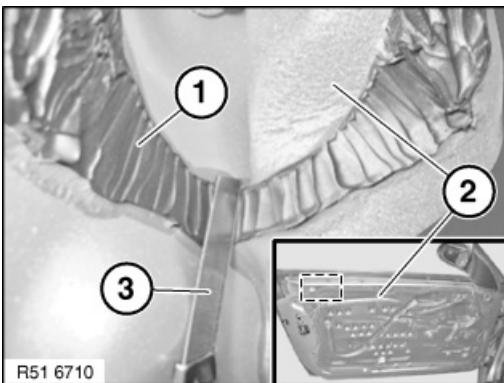
4 – Removing sound insulation on front door



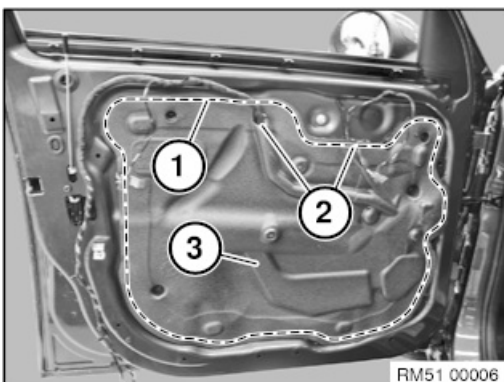
TECHNICAL INFORMATION

Notes on the sound insulation must be strictly observed for these repair instructions.

For more information see: 51 48 ... Notes on bonding the sound insulation (SI) in doors



- When cutting through the sealing bead (1) make sure not to damage the sound insulation (2) and any potentially routed cables.
- Use a suitable, sharp cutting tool (3) to cut through the sealing bead (1) of the sound insulation (2) in the corresponding area.

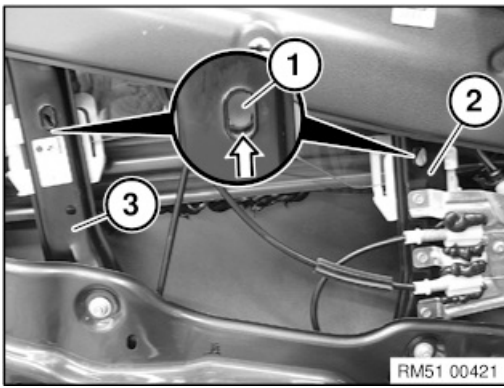


- Completely cut through the sealing bead (1).
- Remove the sound insulation (3) at the cables (2).

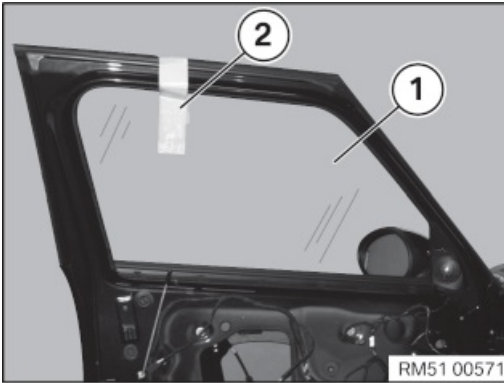
MAIN WORK

5 – Remove the power window regulator from the front door

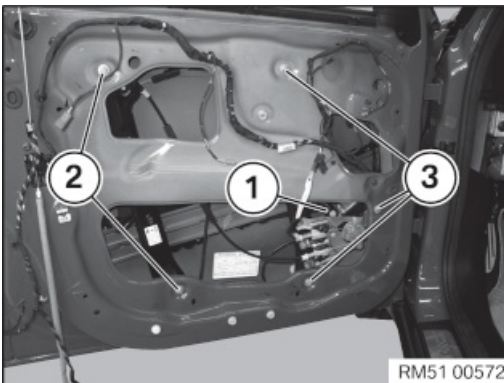




- Electrically move the door window glass until the brackets (1) over the openings at the window guide rails (2) and (3) become accessible.
- Press the brackets (1) out with a suitable tool and remove the door window glass from the brackets (1) to the top.

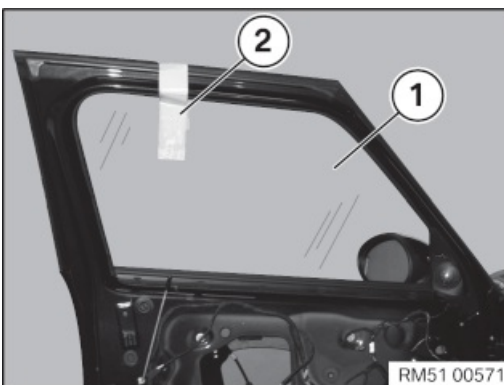


- Completely slide the door window glass (1) up and secure it on the window frame with adhesive tape (2).

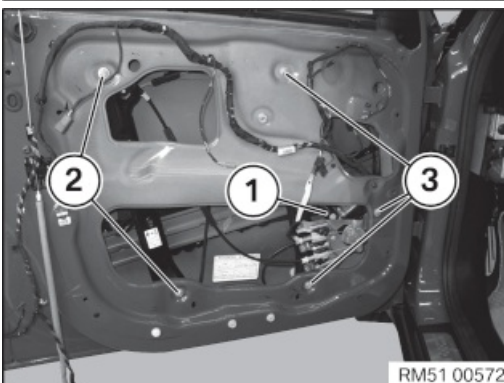


- Unlock plug connection (1) and disconnect.
- Loosen nuts (2) and (3).
- Feed the power window regulator out of the inner door panel.

6 – Install the power window regulator in the front door



- Completely slide the door window glass (1) up and secure it on the window frame with adhesive tape (2).



- Insert the power window regulator in the inner door panel.
- Tighten nuts (2) and (3).

Power window regulator to inner door panel

	7,6 Nm
--	--------

- Connect the plug connection (1).
- Move the power window upwards until the fixed side window glass correctly engages with both holders.
- Remove adhesive tape.



7 – Installing sound insulation on front door



TECHNICAL INFORMATION

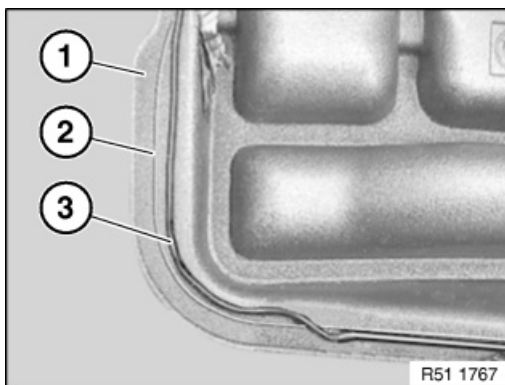
Notes on the sound insulation must be strictly observed for these repair instructions.

For more information see: 51 48 ... Notes on bonding the sound insulation (SI) in doors

- Check the sound insulation for damage. If applicable, replace the sound insulation.

► Replacing the sound insulation

- Clean adhesive area with adhesive remover (sourcing reference: BMW Group Parts).
- After cleaning, do not touch adhesive area with bare hands.
- Air bonding surface for 1 minute.
- Apply 6 mm butyl rope (3) on the mark (2) of the sound insulation (1).



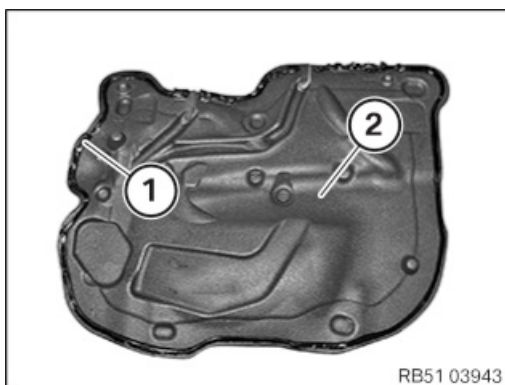
TECHNICAL INFORMATION

Bonding surfaces must be dry and free of dust and grease. After the adhesive area has been cleaned, it must no longer be touched with bare hands.

- Heat butyl rope (3) with hot air blower.
- Press sound insulation (1) onto door.

► Reinstalling the sound insulation

- Attach the new butyl rope (1) (Ø 4 mm) to the existing butyl rope on the sound insulation (2).
- Heat the butyl rope (1) with a hot air blower.
- Press the sound insulation (2) against the door.



8 – Installing the front door trim panel on the left or right (up to 11/2012)



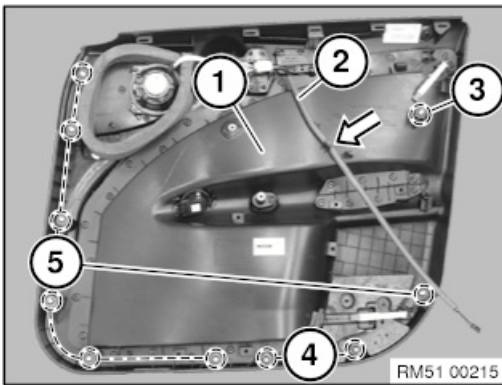
RISK OF DAMAGE

Scratches.

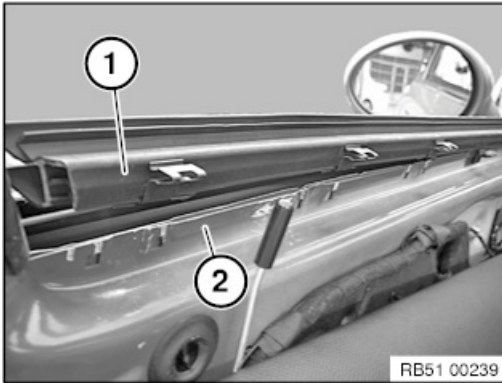
Tools and sharp-edged components can cause scratches.

- Protect working area.
- Handle tools and components carefully.

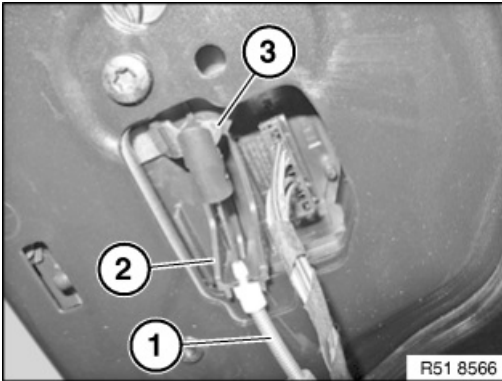




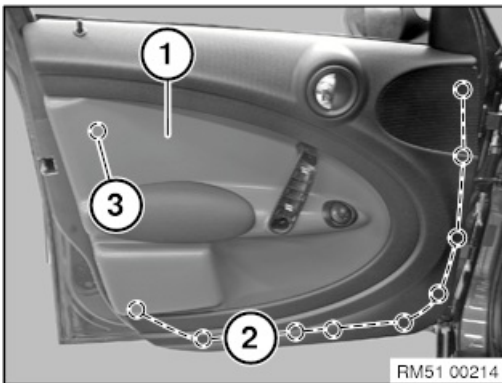
- If necessary, disassemble the remaining clip (3) on the inner door panel and clip it on the door trim panel (1).
- Check clips for damage, renew faulty or missing clips, if required.
The clips (4) are blue, the clips (3) and (5) are white.
- Correctly attach the Bowden cable (2).



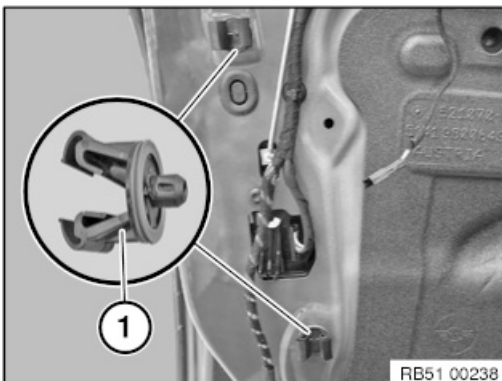
- Unclip the weather strip (1) from the door trim panel.
- Install the weather strip (1) on the window cavity (2).



- Attach the Bowden cable (1) of the inside door handle at the door lock (3).
- Attach the Bowden cable (1) on the counter support.
- Connect all connectors.
- Clip in the vehicle wiring harness on the door trim panel.

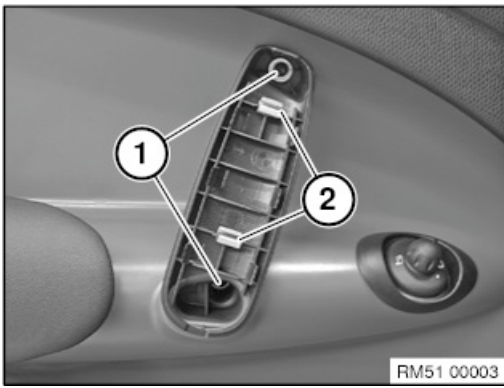


- Clip the door trim panel (1) at the top into the clamps of the weather strip.
- Press the door trim panel (1) at the marked positions (2) and (3).



- Audibly engage the door trim panel in the clips (1).



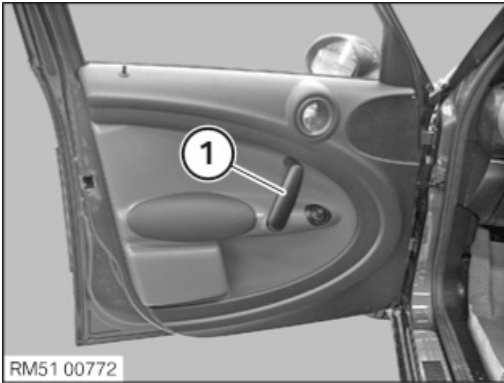


- Tighten the screws (1).

Door trim panel

4,2 Nm

- Check retaining clips for damage, renew faulty or missing retaining clips if required (2).



- Install trim (1).

• After installation of the door trim panel:

- Open side window.
- Check the function of the inside door handle.
- Lock the door with the ignition key.
- Check whether the linkage of the locking button can move freely and align linkage if necessary.

9 – Installing the front door trim panel on the left or right (from 11/2012)

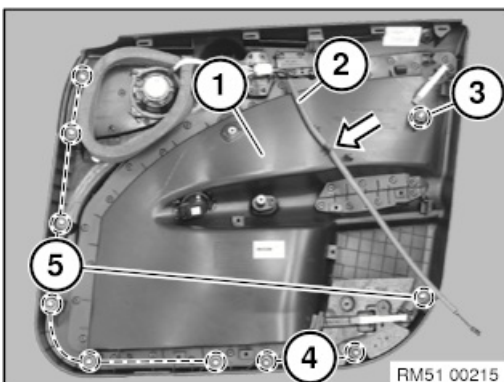


RISK OF DAMAGE

Scratches.

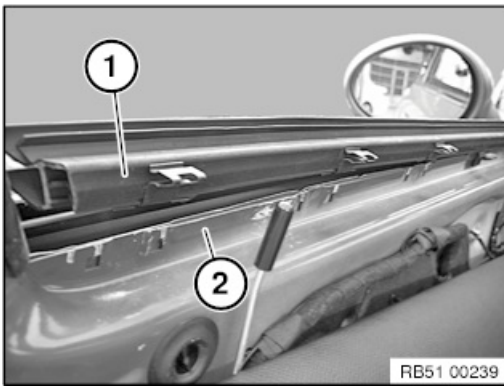
Tools and sharp-edged components can cause scratches.

- Protect working area.
- Handle tools and components carefully.

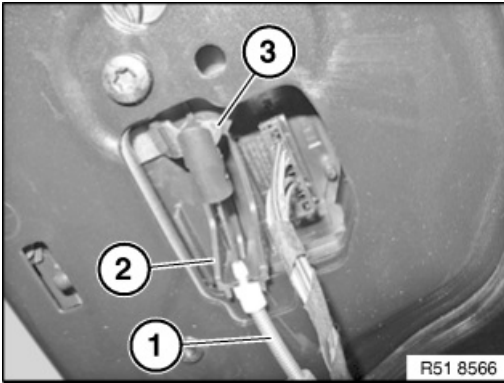


- Correctly attach the Bowden cable (2).
 - If necessary, disassemble the remaining clip (3) on the inner door panel and clip it on the door trim panel (1).
 - Check clips for damage, renew faulty or missing clips, if required.
- The clips (4) are blue, the clips (3) and (5) are white.

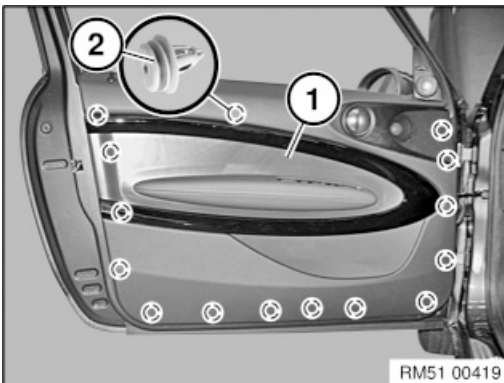




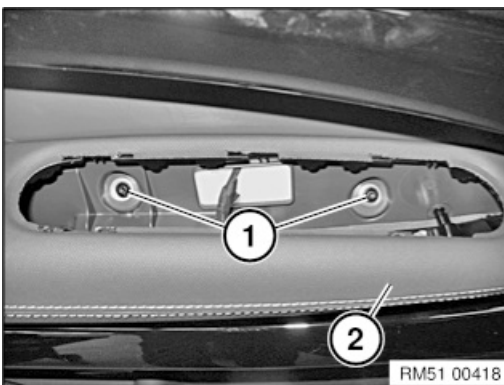
- Unclip the weather strip (1) from the door trim panel.
- Install the weather strip (1) on the window cavity (2).



- Attach the Bowden cable (1) of the inside door handle at the door lock (3).
- Attach the Bowden cable (1) on the counter support.
- Connect all connectors.
- Clip in the vehicle wiring harness on the door trim panel.



- Engage the door trim panel (1) in the clips (2).



- Tighten the screw (1) in the door trim panel (2).

• **After installation of the door trim panel:**

- Open side window.
- Check the function of the inside door handle.
- Lock the door with the ignition key.
- Check whether the linkage of the locking button can move freely and align linkage if necessary.

10 – Installing the handle recess in the front door trim panel



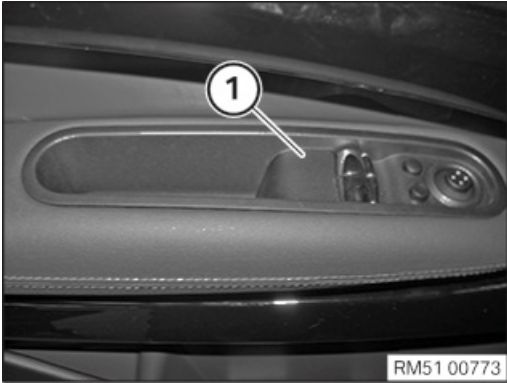


RISK OF DAMAGE

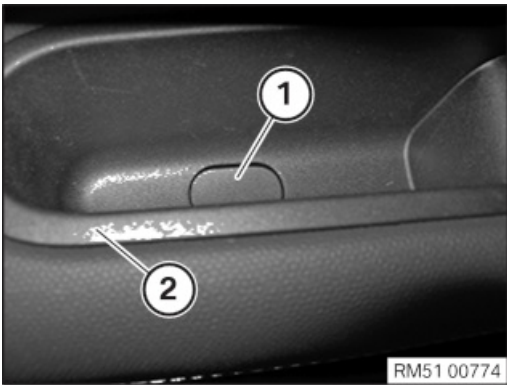
Scratches.

Tools and sharp-edged components can cause scratches.

- Protect working area.
- Handle tools and components carefully.



- Connect associated plug connections.
- Start at the front and clip in the handle recess (1).
- Tighten down screw.



- Clip in the cover (1) into the handle recess (2).

Additional Information

Overview of Tightening Torques

Power window regulator to inner door panel	Used in step 6
	7,6 Nm
Door trim panel	Used in step 8
	4,2 Nm

Overview of Special Tools

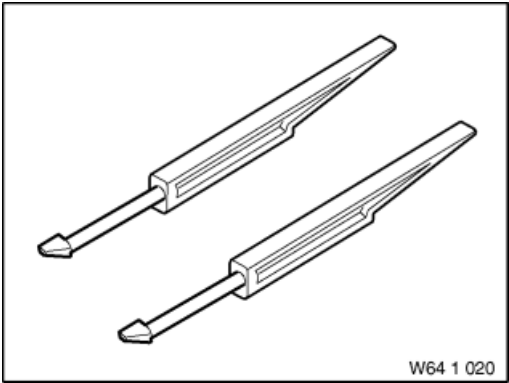


0 496 569 (00 9 325) Wedge



Common		Used in step	123
Usage	(Panel wedge) From 11/2008 this special tool replaces panel wedge 00 9 317 (different material)		
Included in the tool or work	0 490 527		
Storage location	Individual		
Replaced by			
In connection with			
SI-Number	41 01 09 (507)		

0 493 681 (64 1 020) Hook



Common		Used in step	2
Usage	(release hook) For releasing and removing fresh air grille. For removing various covers.		
Included in the tool or work			
Storage location	C2		
Replaced by			
In connection with			
SI-Number	01 15 99 (483)		

Links

General repair instructions	Used in step
51 48 ... Notes for bonding sound insulation (SI), doors	47

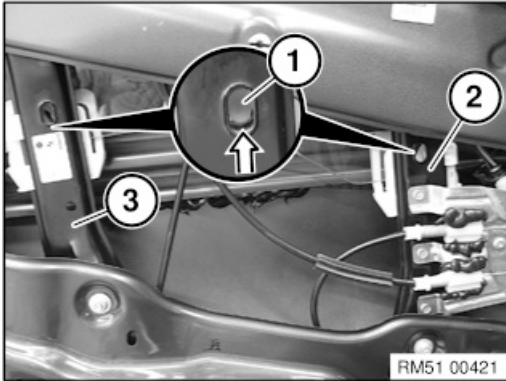


51 33 000 Removing and installing (replacing) power window regulator in left or right front door



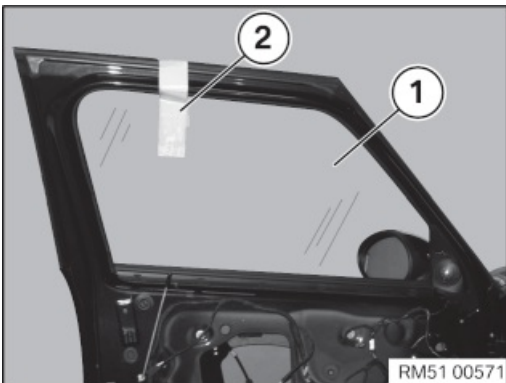
Necessary preliminary tasks:

- Remove sound insulation

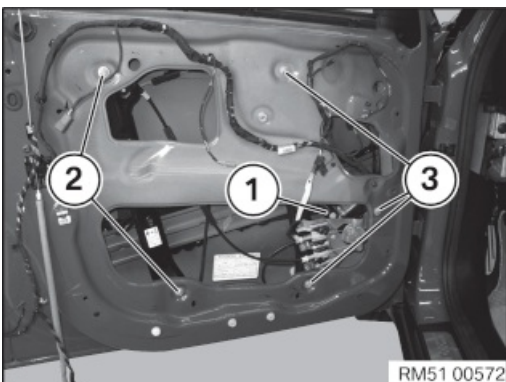


Electrically move the door window glass until the brackets (1) are accessible via the opening on window guide rails (2 and 3).

Press the brackets (1) toward the outside with a suitable tool and feed out the door window glass upwards out of bracket (1).



Slide door window glass (1) fully upwards and fix in the window frame with adhesive tape (2).



Unfasten plug connection (1) and disconnect.

Release nuts (2 and 3).

Tightening torque 51 33 1AZ.

Feed out power window regulator from inner door panel.



Replacement

- Remount flat motor



51 32 420 Removing and installing/replacing cover on window frame (B-pillar) of front door, left or right

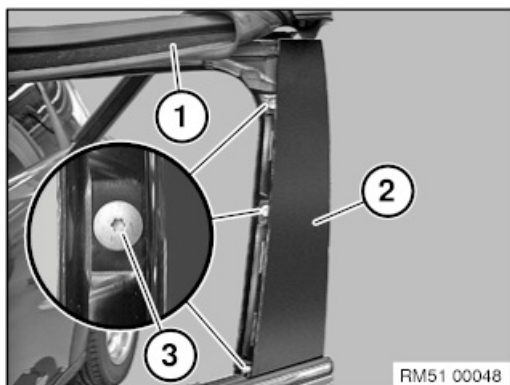


Necessary preliminary tasks:

- Completely open side window if necessary



Work shown on the R60 by way of example, deviations in detail are possible in other models.

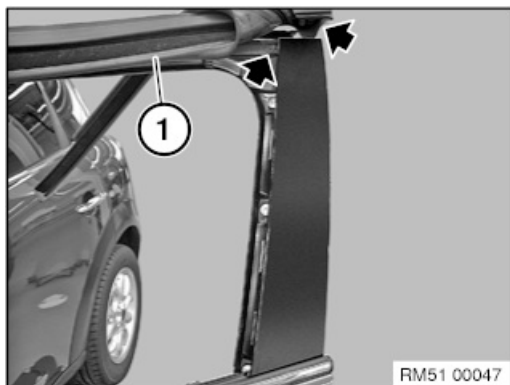


Feed out rubber window seal (1) toward the top as shown.

Release screws (3) from window frame cover (2).

Tightening torque 51 33 5AZ.

Pull out window frame cover (2) toward the top.



Installation note:

To facilitate installation, moisten rubber window seal (1) slightly with water.

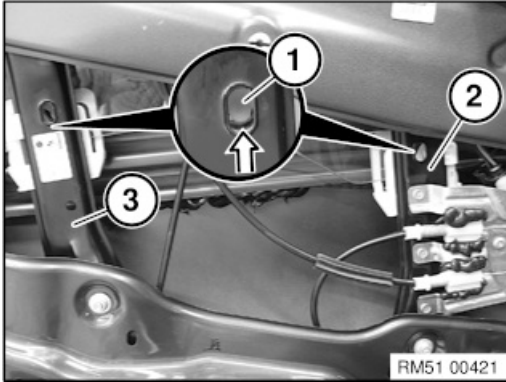
Feed in rubber window seal (1) correctly at the angle of the window frame.





Necessary preliminary tasks:

- Remove weather strip
- Remove sound insulation



Electrically move the door window glass until the brackets (1) are accessible via the opening on the window guide rail (2 and 3).

Press the brackets (1) toward the outside with a suitable tool and feed the door window glass out in upward direction.

Tilt door window forward and lift out of the door toward the top.



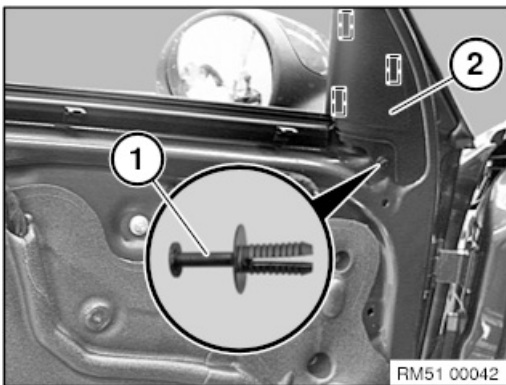


Necessary preliminary tasks:

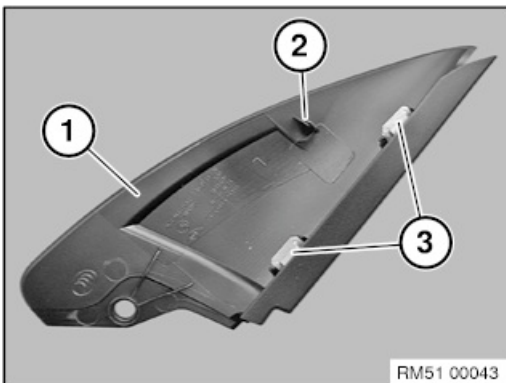
- Remove weather strip
- Remove door trim panel



Repair work shown on the R60 by way of example, deviations in detail are possible in other models.

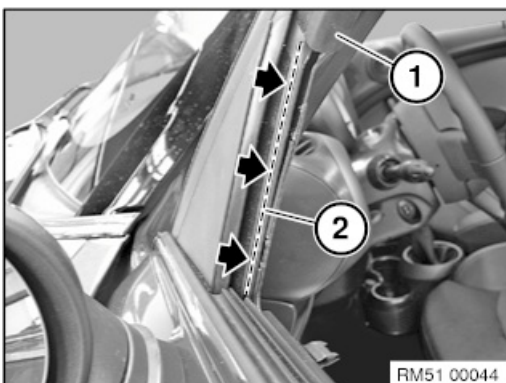


Release expanding rivet (1) from window frame cover (2).
Clip out window frame cover (2) towards rear.



Installation note:

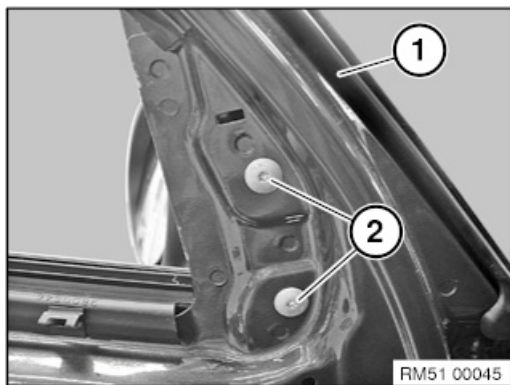
Hooks (2) and retaining clips (3) of window frame cover (1) must not be missing or damaged.



Installation note:

Feed window frame cover correctly into groove (2) of rubber window seal (1).

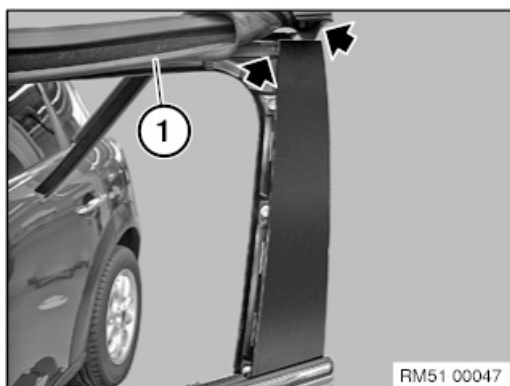




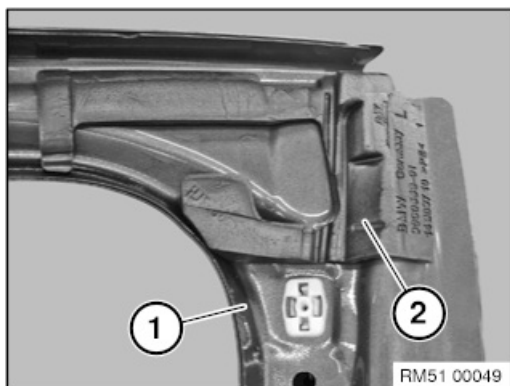
Release screws (2) of rubber window seal (1).
Tightening torque 51 33 4AZ.



Feed out rubber window seal (1) beginning at the front. *Installation note:*
To facilitate installation, moisten rubber window seal (1) slightly with water.

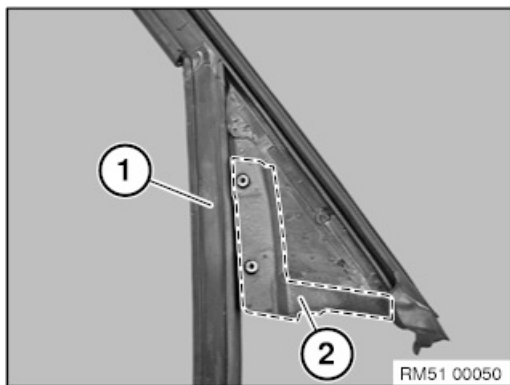


Installation note:
Feed in rubber window seal (1) correctly at the angle of the window frame.



Installation note:
Sealing (2) on rubber window seal (1) must not be missing or damaged.



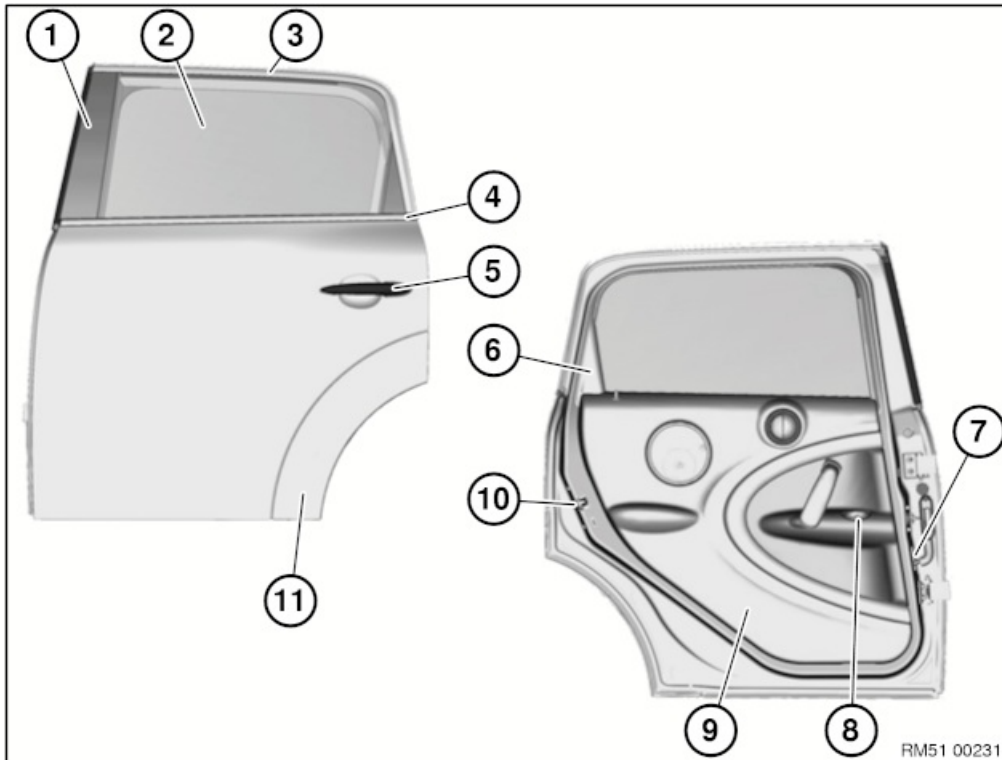


Installation note:

Sealing (2) on window frame (1) must not be missing or damaged.



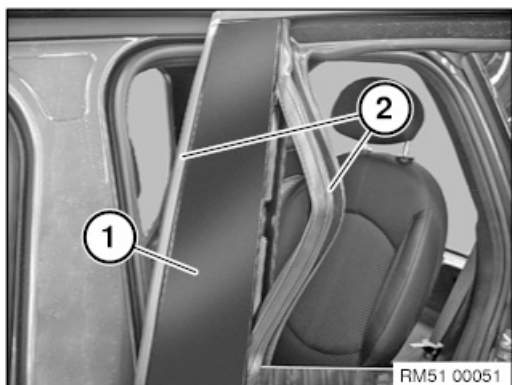
51 00 .. Overview of rear door



- | | |
|--|--------------------------------------|
| 1 Trim on window frame | 7 Door brake |
| 2 Door window glass | 8 Rocker switch for window operation |
| 3 Rubber guide for door window glass | 9 Door trim panel |
| 4 Window cavity cover strip | 10 Door lock |
| 5 Outside handle | 11 Wheel arch cover |
| 6 Window frame cover (refer to rubber window seal for door window) | |

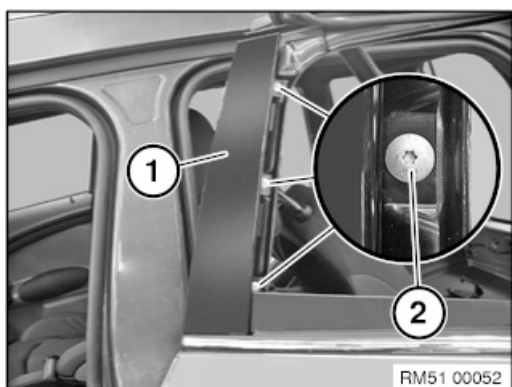


51 34 420 Removing and installing/replacing cover on window frame (B-pillar) of rear door, left or right



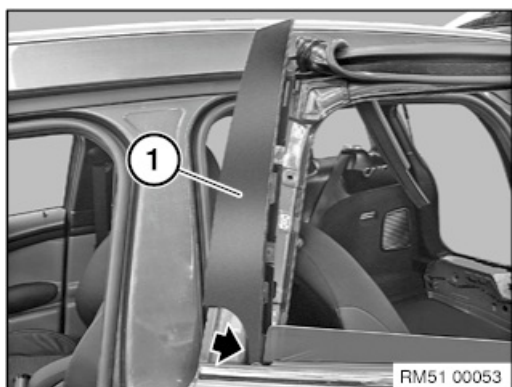
Feed out rubber window seal (2) in area of cover on window frame (1) toward the top. *Installation note:*

To facilitate installation, moisten rubber window seal (1) slightly with water.



Release screws (2) from window frame cover (1).

Tightening torque 51 35 1AZ.

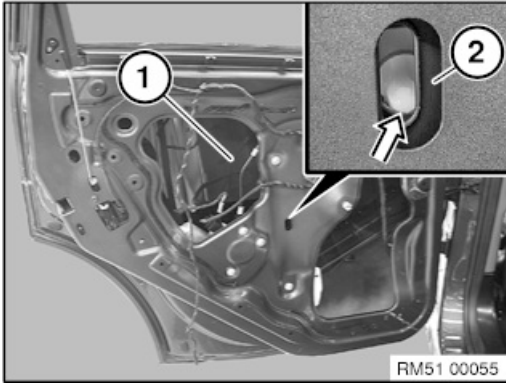


Pull out window frame cover (1) toward the top. *Installation note:*
Feed in cover (1) correctly on window frame at bottom.



**Necessary preliminary work:**

- Completely open door window if necessary
- Remove weather strip
- Remove cover on window frame
- Remove sound insulation



Electrically move door window (1) until door window (1) can be unlocked from bracket via opening (2).

Tilt door window (1) forward and lift out toward the top.

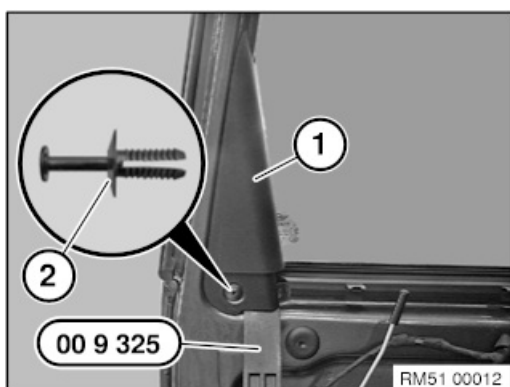


**Special tools required:**

- 00 9 325

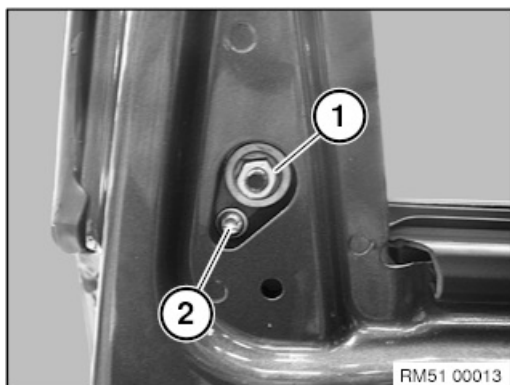
**Necessary preliminary work:**

- Completely open door window if necessary
- Remove cover on window frame
- Partially remove sound insulation (area of door lock)



Open expanding rivet (2) and lever out of cover (1) using special tool 00 9 325 .

Feed out cover (1) and place to one side.



Remove adhesive tape.

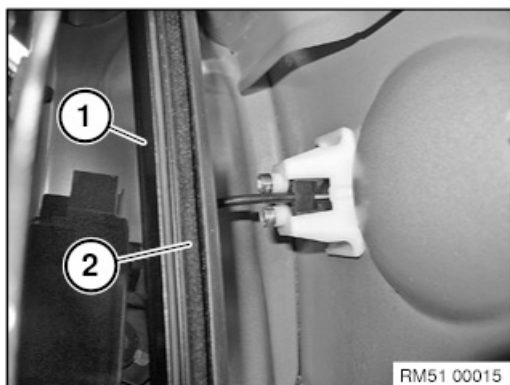
Release screw (2).

Tightening torque 51 35 2AZ.

Installation note:

Cover at rubber window seal must be flush against the window frame.

Seal must not be damaged or missing.



Raise the side window half way.

Feed rubber window seal (2) out of guide rail (1), and then open the door window completely again.

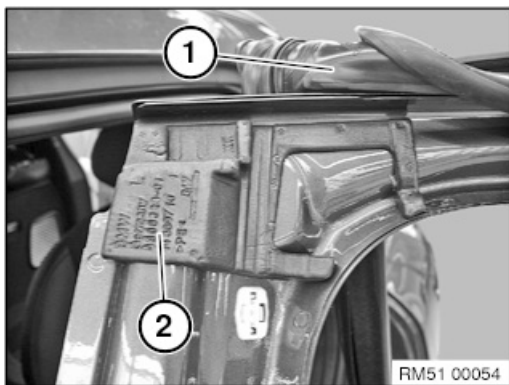
Installation note:

To facilitate installation, moisten rubber window seal (2) slightly with water.

Half close door window, feed in rubber window seal (2) from above and pull down.

Completely open door window again.





Feed out rubber window seal (1) beginning at the front. *Installation note:* Seal (2) must not be missing or damaged.

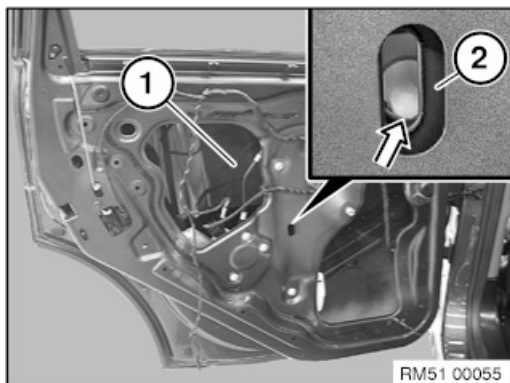


51 37 000 Removing and installing/replacing complete rear left or right power window regulator



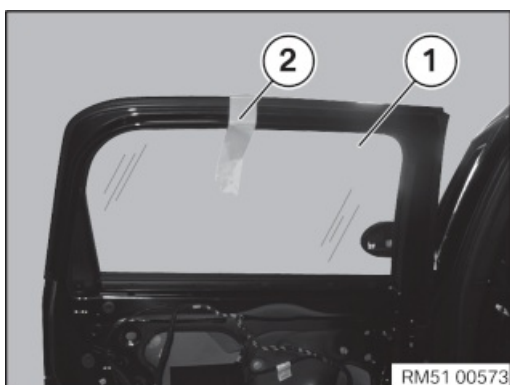
Necessary preliminary tasks:

- Remove sound insulation

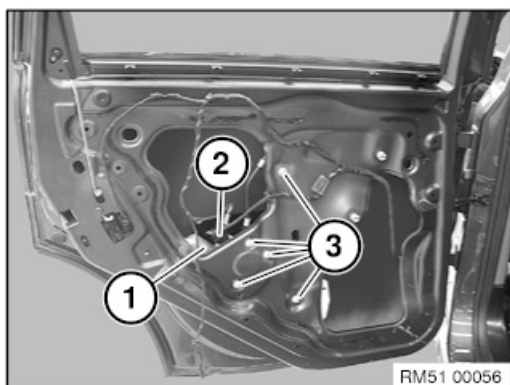


Electrically move door window (1) until door window (1) can be unlocked from bracket via opening (2).

Press the brackets toward the outside with a suitable tool and feed out the door window glass (1) upwards out of bracket.



Slide door window glass (1) fully upwards and fix in the window frame with adhesive tape (2).



Unlock and disconnect plug connection (2) at flat motor (1).

Unscrew nuts (3).

Tightening torque 51 35 4AZ.

Feed out power window regulator (1) from inner door panel.

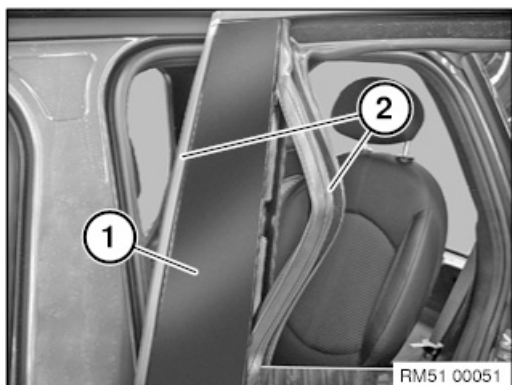


Replacement

- Remount flat motor

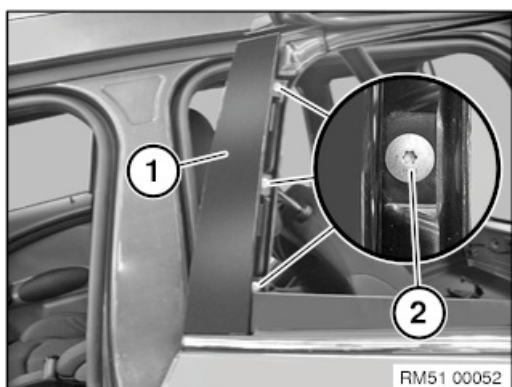


51 34 420 Removing and installing/replacing cover on window frame (B-pillar) of rear door, left or right



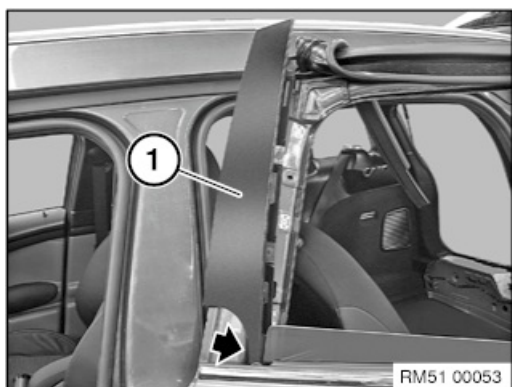
Feed out rubber window seal (2) in area of cover on window frame (1) toward the top. *Installation note:*

To facilitate installation, moisten rubber window seal (1) slightly with water.



Release screws (2) from window frame cover (1).

Tightening torque 51 35 1AZ.

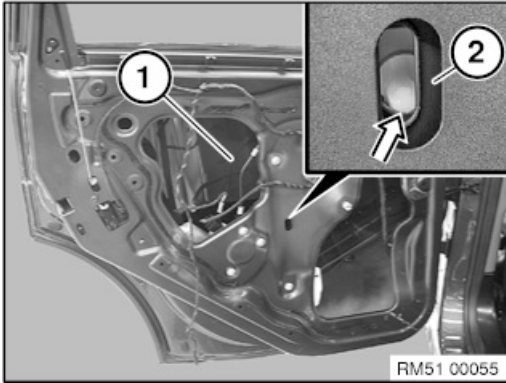


Pull out window frame cover (1) toward the top. *Installation note:*
Feed in cover (1) correctly on window frame at bottom.



**Necessary preliminary work:**

- Completely open door window if necessary
- Remove weather strip
- Remove cover on window frame
- Remove sound insulation



Electrically move door window (1) until door window (1) can be unlocked from bracket via opening (2).

Tilt door window (1) forward and lift out toward the top.

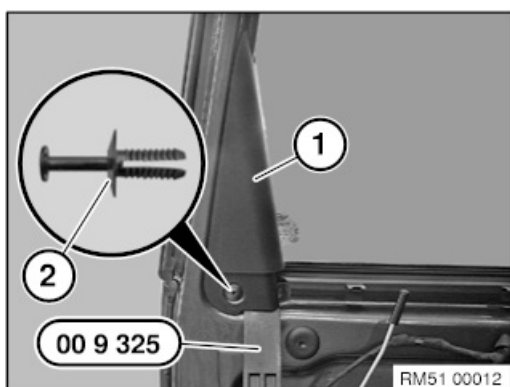


**Special tools required:**

- 00 9 325

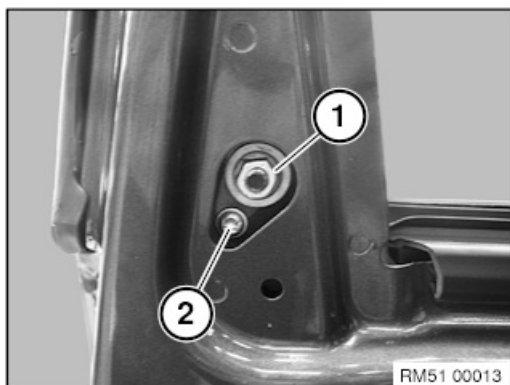
**Necessary preliminary work:**

- Completely open door window if necessary
- Remove cover on window frame
- Partially remove sound insulation (area of door lock)



Open expanding rivet (2) and lever out of cover (1) using special tool 00 9 325 .

Feed out cover (1) and place to one side.



Remove adhesive tape.

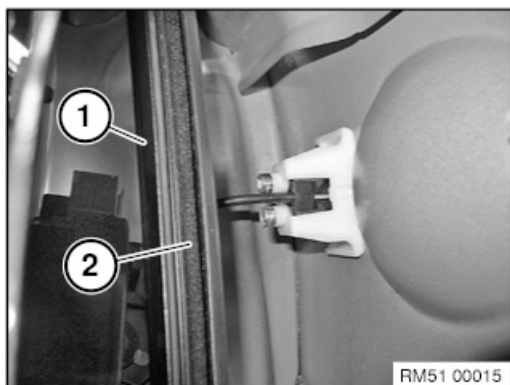
Release screw (2).

Tightening torque 51 35 2AZ.

Installation note:

Cover at rubber window seal must be flush against the window frame.

Seal must not be damaged or missing.



Raise the side window half way.

Feed rubber window seal (2) out of guide rail (1), and then open the door window completely again.

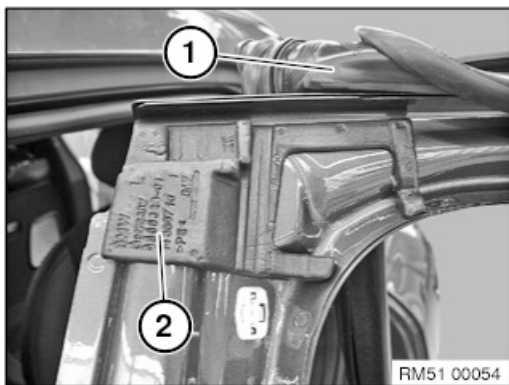
Installation note:

To facilitate installation, moisten rubber window seal (2) slightly with water.

Half close door window, feed in rubber window seal (2) from above and pull down.

Completely open door window again.





Feed out rubber window seal (1) beginning at the front. *Installation note:* Seal (2) must not be missing or damaged.



**Special tools required:**

- 00 9 322
- 51 3 010

**Important!**

"Instructions on window bonding" serve as the basis for these repair instructions and must be observed without fail.

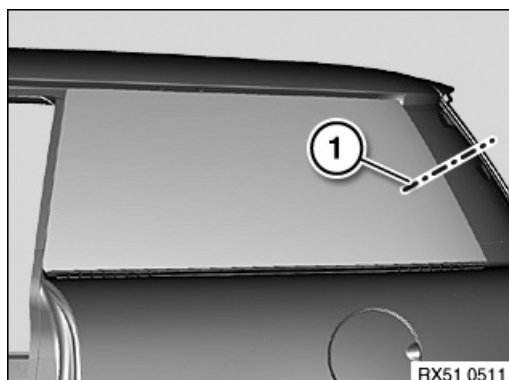
Cover rear side panels with protective covers.

Note:

Removal is performed with Roll Out 2000. Only use an oscillating blade when the side window is broken.

**Necessary preliminary tasks:**

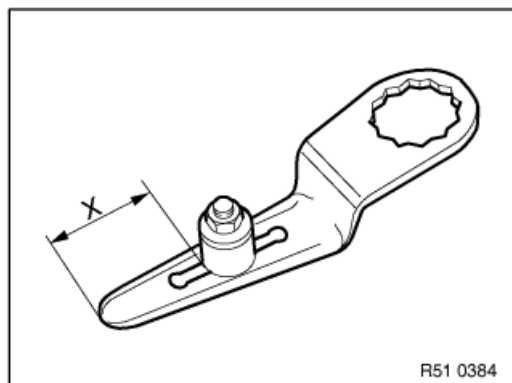
- Remove cover on C-pillar
- Remove cover on roof pillar at rear
- Remove luggage compartment wheel arch panel
- Lower side windows of front doors if necessary

**Important!**

Risk of damage!

Tape off body in area of piercing point with fabric adhesive tape.

Push wire starter from Roll Out 2000 at line (1) through adhesive bead.

**Replacement only (broken side window):**

Fit straight blade with adjustable roller (Sourcing Reference: BMW Parts Department) on tool and set dimension (X).

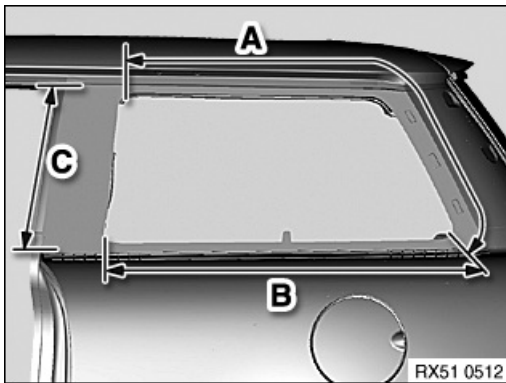
Adjust dimension (X) differently according to different position of adhesive bead (see next operation).

Note:

Sharpen knife blade before every use on a running machine (even with new knife blades).

Tape off side window and sheet metal flange all round with fabric adhesive tape (e.g. Tesa).





Replacement only (broken side window):

Adjust thrust roller differently for areas (A to C).

Cut area C from the outer front.

A = 25 mm

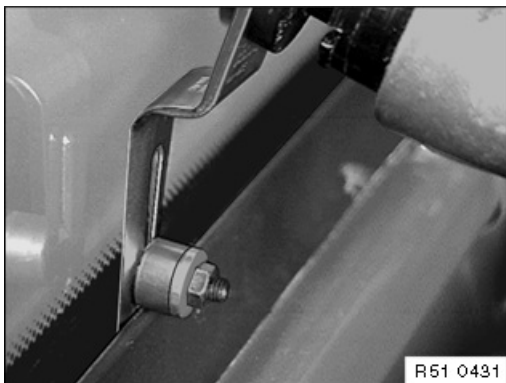
B = 20 mm

C = 35 mm

Areas which are not reached with the blade must be worked on with a scalpel (for heavy-duty applications).

Important!

During the cutting procedure, a 2nd person must pull the side window at rear in outwards direction using special tool 51 3 010 .



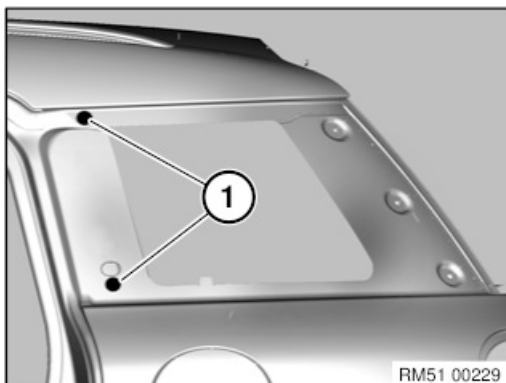
Replacement only (broken side window):

Secure outside of side window with adhesive tape.

Insert blade carefully between body and side window.

Guide web of blade parallel to side window. Cut through adhesive bead as close to body as possible.

Remove side window with special tool 51 3 010 .



Installation of the spacers:

Installation positions of the semicircular spacer buffers (1) are marked on the sheet metal flange.

Semicircular spacer buffers (1) must be mounted centrally so that they cover the embossed marks on the sheet metal flange.

Part numbers: Semicircular spacer buffer 7 061 285 *.

* Sourcing reference: BMW Parts Department

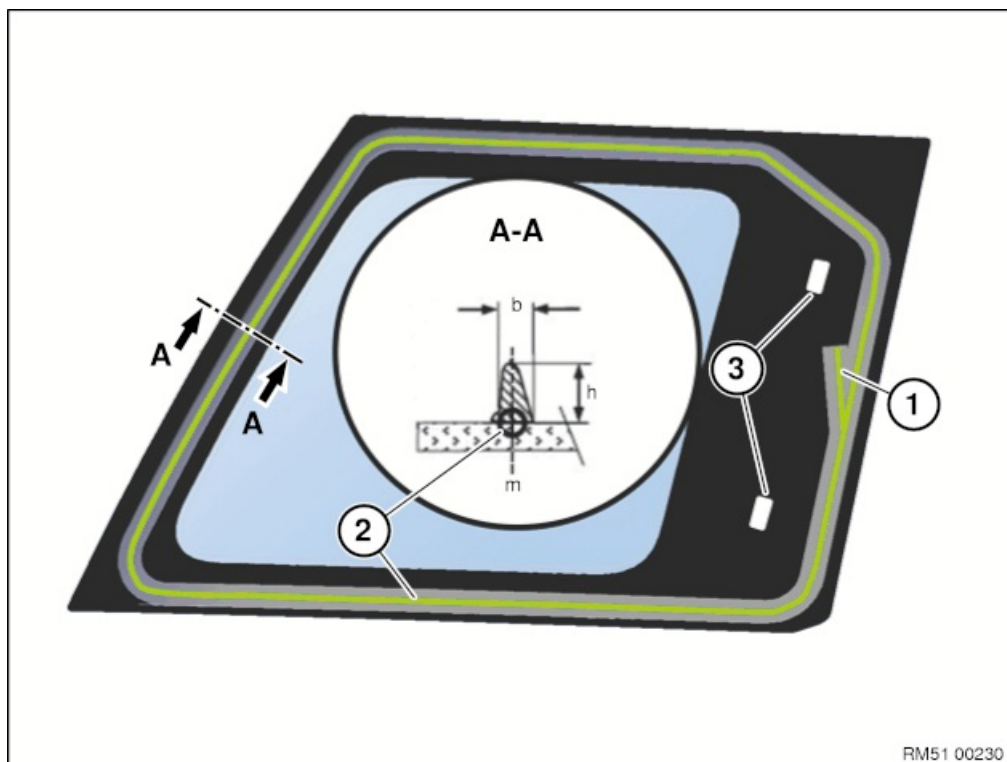
Important!

To avoid window glass breakage and leaks:

Completely remove the remnants of the removed spacer buffers and maintain the installation location exactly.

Overview for side window bonding:





RM51 00230

1 = adhesive bead joint

2 = centre of the adhesive bead position

3 = position of Dual Locks on side window

Cut	A - A
m = position of adhesive bead	Centrally aligned with mark (2) on ceramic layer (window glass)
b [mm] = Width adhesive bead	$7 \pm 1^*$
h [mm] = Height adhesive bead	$11 \pm 2^*$
* Corresponds to nozzle C (standard adhesive bead)	

Attach two special tools 51 3 010 to tool trolley. Moisten suction faces and secure side window.

When reusing the existing side window, remove residual adhesive to 0.5 mm.

Spread bead joint (1) with special tool 00 9 322 .



Carefully working on side window with special tool 51 3 010 :

- position at bottom on side frame
- insert at top and press down
- secure vertically with yellow plastic adhesive tape

Note:

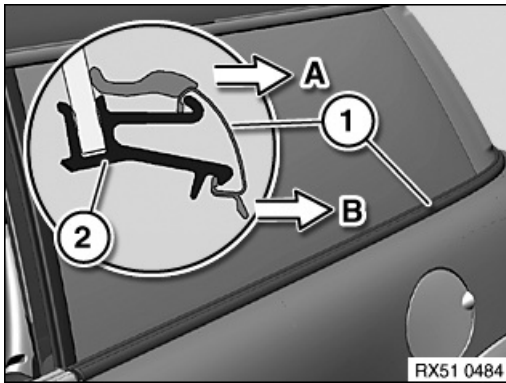
Reassemble the vehicle.

Remove adhesive tape strips after the hardening time.



51 36 040 window

Removing and installing/replacing strip on rear left or right side



(Picture shows: R56)

Starting at front, unclip strip (1) first at top (A) then at bottom (B) from retaining strip (2).

Installation note:

Retaining strip (2) must not be damaged.

Start assembly at rear.

Clip in first at bottom (B) then at top (A).

Make sure strip (1) is correctly seated in area of door and tailgate.





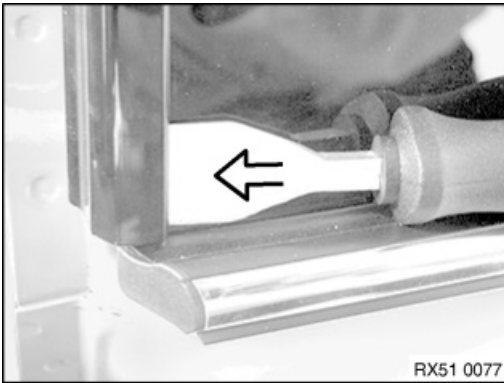
Important!

To avoid damaging the trim cover, do not apply excessive force and lever out too far.



Installation note:

- Remove strip on side window at bottom rear



Note:

Graphic shows schematic diagram for R50 .

Lift off trim strip using a sharp scraper (as illustrated). *Installation note:* Clean remains of adhesive from window and trim strip.

Affix new piece of adhesive tape to trim strip and secure trim strip to window.

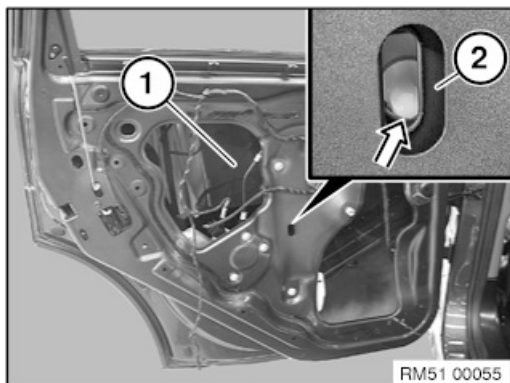


51 37 000 Removing and installing/replacing complete rear left or right power window regulator



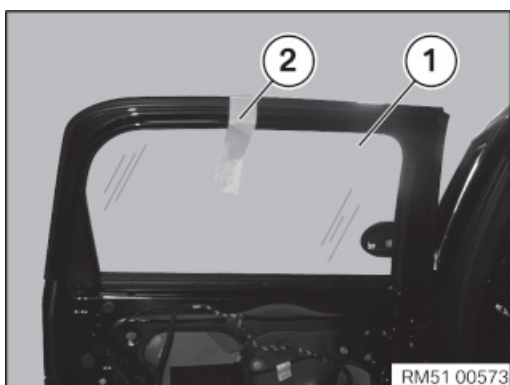
Necessary preliminary tasks:

- Remove sound insulation

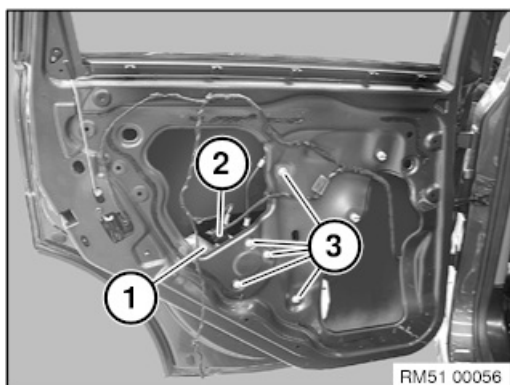


Electrically move door window (1) until door window (1) can be unlocked from bracket via opening (2).

Press the brackets toward the outside with a suitable tool and feed out the door window glass (1) upwards out of bracket.



Slide door window glass (1) fully upwards and fix in the window frame with adhesive tape (2).



Unlock and disconnect plug connection (2) at flat motor (1).

Unscrew nuts (3).

Tightening torque 51 35 4AZ.

Feed out power window regulator (1) from inner door panel.



Replacement

- Remount flat motor



51 48 ... Notes for bonding sound insulation (SI), doors



Special tools required:

- 51 0 300

Attention!

Do not yank at the sound insulation (risk of damage).

General:

Sound insulation is bonded to the inner door panel.

Bonded sound insulation must not be subjected to load (e.g. leak test) before 5 hours have elapsed.

On-the-job safety:

When working with bonding products (adhesive, cleaning agent, etc.):

- Wear safety goggles, protective gloves and if necessary an apron.
- Ensure the area is well ventilated.
- Change work clothing contaminated with adhesive immediately.
- Change work clothing contaminated with solvents and swelling agents immediately (keep spare work clothing on hand).
- Take skin protection measures, provide washing facilities including hot water, use silicone-free skin creams.
- Always keep an eye douche on hand, change the water regularly (once a month).
- Comply with the relevant safety regulations.

Handling adhesive area on inner door panel:

Adhesive	Cleaning
a. Butyl bead applied to sound insulation with protective film	a. Cleaning agent R2 <i>Under no circumstances: paint thinning</i>
b. Butyl mini-round profile \varnothing 4 mm from the roller	b. Carry out bonding only after an air drying time \geq 1 min. Air drying time may be omitted if the entire bonding surface is wiped with a dry cloth
c. Butyl round profile \varnothing 6 mm from the roller	c. After cleaning, the bonding surface may not be touched with hands or fouled again

Repair in area of sound insulation, door:

Repair	<ul style="list-style-type: none">• Cut the butyl rope between the sound insulation and the inner door panel with a sharp knife• After the repair is finished, position a new butyl rope \varnothing 4 mm directly on the original adhesive bead• Heat the butyl bead with a standard hot air blower until the butyl rope strings when touched slightly. Do not damage the sound insulation in the process• Press on with special tool 51 0 300. Perform this work extremely carefully because the increased amount of adhesive requires contact pressure of \geq 20 N/cm² (compared to firm thumb pressure \sim 30 N/cm²)• Visually check the adhesive bead and its compression (no capillaries or broken adhesive bead permitted)
--------	--



in the event of
damaged sound
insulation or
leakage

- In the cases mentioned, the complete sound insulation must be replaced. After removing the sound insulation, removal all butyl remnants from the inner door panel. Apply 6 mm \varnothing butyl rope to new sound insulation
- Press on with special tool 51 0 300. Contact pressure $\geq 20 \text{ N/cm}^2$ (compare to firm thumb pressure $\sim 30 \text{ N/cm}^2$)

The sound insulation must be bonded watertight below the door lock:

- Flat bonding surface required all round.
- No bonding in the event of moisture (e.g. condensation, etc.).
- Bonding area must not show any traces of adhesion-reducing residues (e.g. separating agents, greases, oils, paraffins, plastisols, cavity wax, polishing dust residues, etc.).
- Remove the protective film directly before joining (under no circumstances remove earlier, since the butyl, because of its stickiness, will very quickly pick up adhesion-reducing dirt contaminants).
- The sound insulation must be attached with positional accuracy to the inner door panel because it will no longer be possible to change the position without damaging the butyl bead.
- With repainted areas, the maximum permitted temperature of 90°C may not be exceeded in the area of the sound insulation. Otherwise, the sound insulation must be removed (and replaced, if necessary).

Expiry date of adhesive:

24 months, see label on packaging.

Disposal of the cleaning cloth:

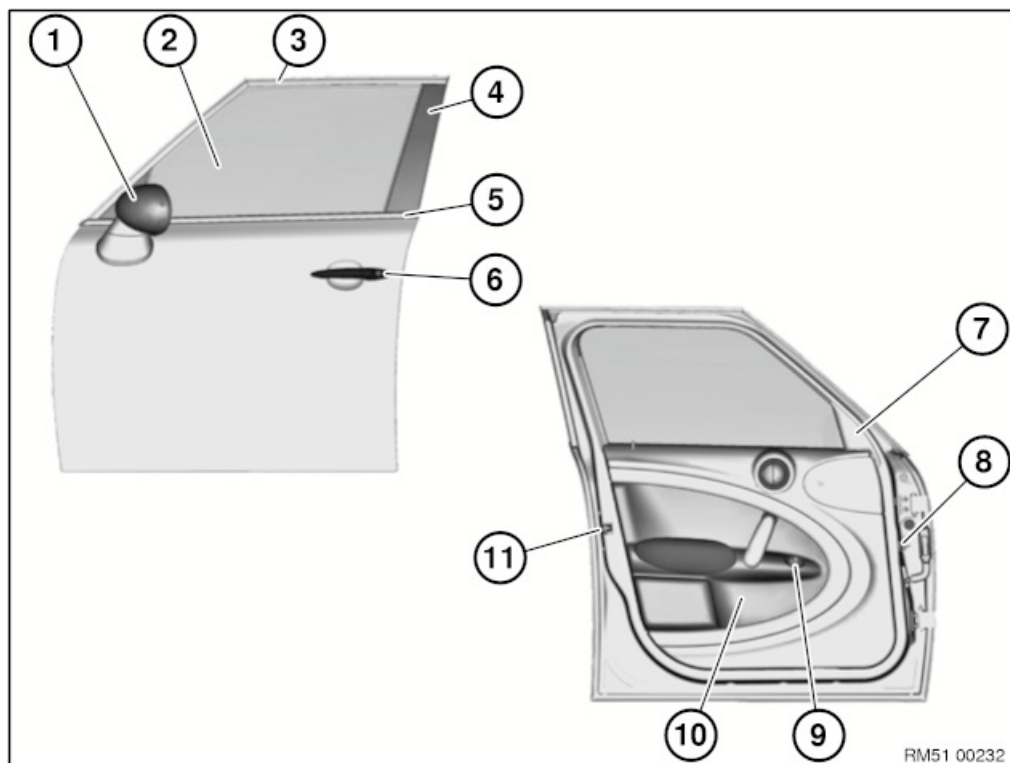
Cleaning cloths and cleaning agent residues are hazardous waste (see also safety data sheet).

Disposal of adhesive:

Hazardous waste (see also safety data sheet).



51 00 .. Overview of front door



- | | |
|--------------------------------------|--|
| 1 Exterior mirror | 7 Cover on window frame (see rubber window seal for door window) |
| 2 Door window glass | 8 Door brake |
| 3 Rubber guide for door window glass | 9 Switch for exterior mirror/power window regulator |
| 4 Trim on window frame | 10 Door trim panel |
| 5 Window cavity cover strip | 11 Door lock |
| 6 Outer door handle | |



51 41 110 Remove and install / replace the driver's side handle recess (front passenger side)

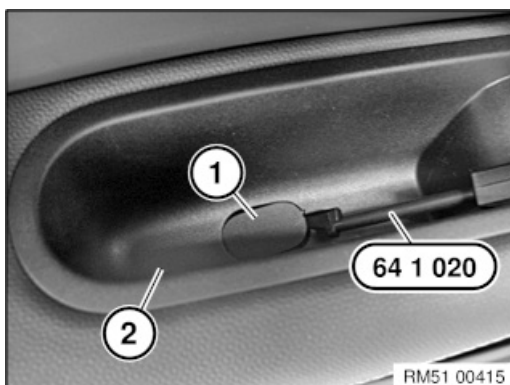


Special tools required:

- 64 1 020

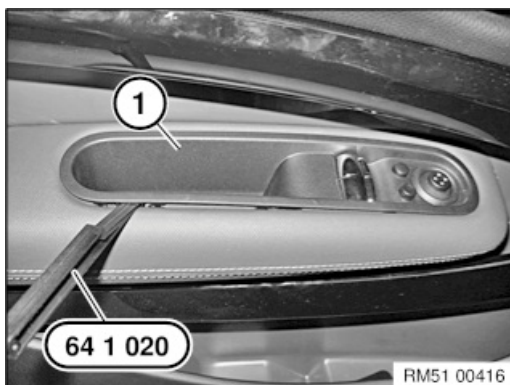


When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



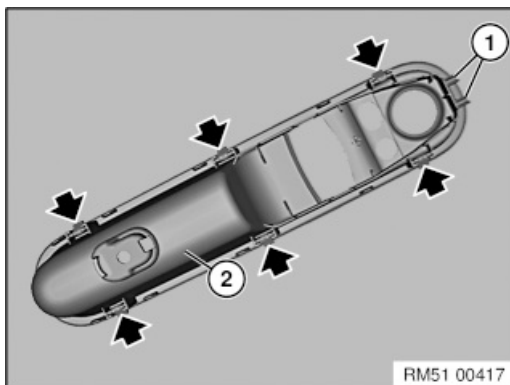
Unclip the cover (1) with special tool 64 1 020 from the handle recess (2) and loosen the screw below it.

Tightening torque 51 41 3AZ.



Unclip the handle recess (1) with special tool 64 1 020 starting at the rear.

Disconnect the associated plug connections and remove the handle recess (2).



Installation note:

Guides (1) and marked spring clips for handle recess (2) must not be damaged or missing.





Replacement:

Modify power window switch.



51 41 110 Remove and install handle recess on driver's side \ PREMIUM

1 – Removing the handle recess in the front door trim panel

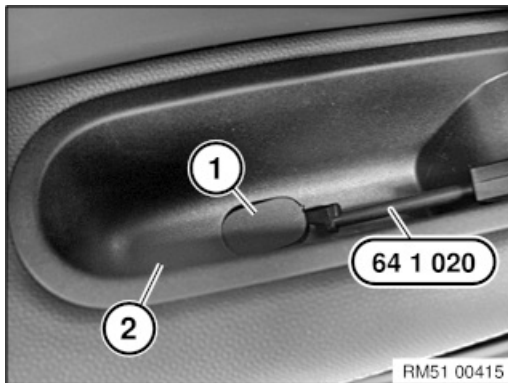


RISK OF DAMAGE

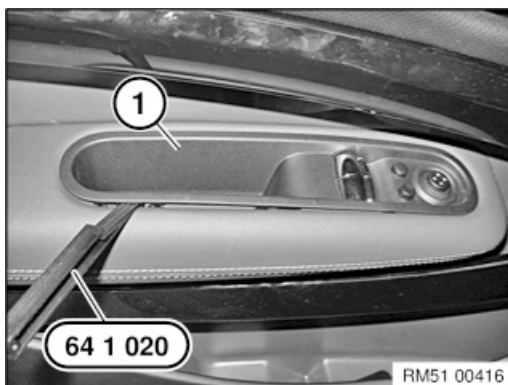
Scratches.

Tools and sharp-edged components can cause scratches.

- Protect working area.
- Handle tools and components carefully.



- Unclip the cover (1) using special tool [0 496 569 \(00 9 325\)](#) from the handle recess (2).
- Release screw underneath.



- Start at the rear and unclip the handle recess (1) using special tool [0 496 569 \(00 9 325\)](#).
- Disconnect the associated plug connection and remove the handle recess (2).

2 – Installing the handle recess in the front door trim panel



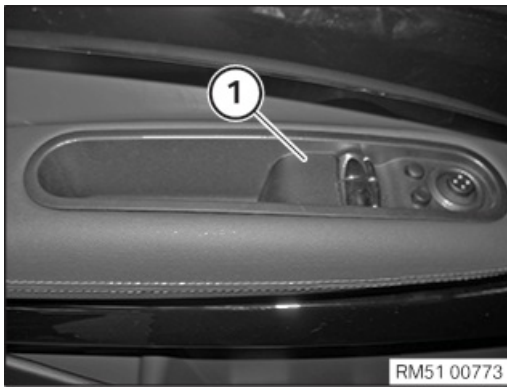
RISK OF DAMAGE

Scratches.

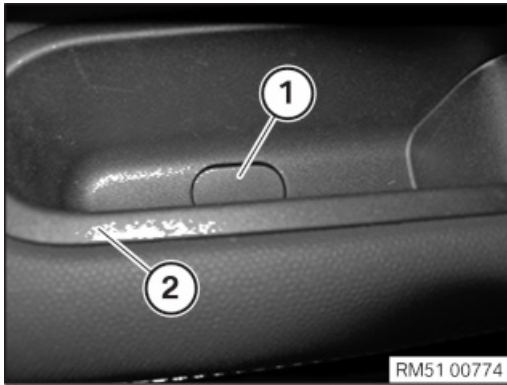
Tools and sharp-edged components can cause scratches.

- Protect working area.
- Handle tools and components carefully.





- Connect associated plug connections.
- Start at the front and clip in the handle recess (1).
- Tighten down screw.



- Clip in the cover (1) into the handle recess (2).

Additional Information

Overview of Special Tools

0 496 569 (00 9 325) Wedge



Common

Used in step 1

Usage	(Panel wedge) From 11/2008 this special tool replaces panel wedge 00 9 317 (different material)
Included in the tool or work	0 490 527
Storage location	Individual
Replaced by	
In connection with	
SI-Number	41 01 09 (507)



51 41 115 Remove and install the passenger's side handle recess \ PREMIUM



NOTICE

Description is for left component only. Procedure on the right side is identical.

1 – Removing the handle recess in the front door trim panel

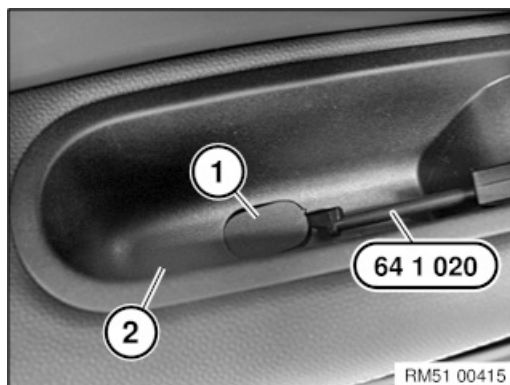


RISK OF DAMAGE

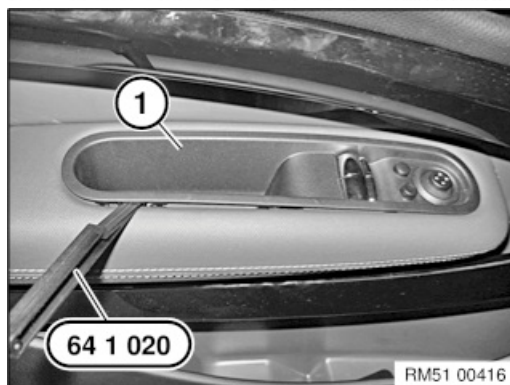
Scratches.

Tools and sharp-edged components can cause scratches.

- Protect working area.
- Handle tools and components carefully.



- Unclip the cover (1) using special tool [0 496 569 \(00 9 325\)](#) from the handle recess (2).
- Release screw underneath.



- Start at the rear and unclip the handle recess (1) using special tool [0 496 569 \(00 9 325\)](#).
- Disconnect the associated plug connection and remove the handle recess (2).

2 – Installing the handle recess in the front door trim panel



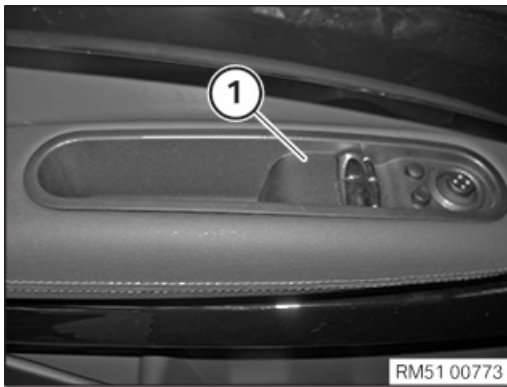
RISK OF DAMAGE

Scratches.

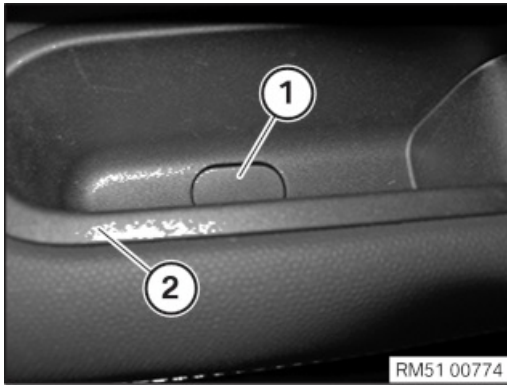
Tools and sharp-edged components can cause scratches.

- Protect working area.
- Handle tools and components carefully.





- Connect associated plug connections.
- Start at the front and clip in the handle recess (1).
- Tighten down screw.



- Clip in the cover (1) into the handle recess (2).

Additional Information

Overview of Special Tools

0 496 569 (00 9 325) Wedge



Common

Used in step 1

Usage	(Panel wedge) From 11/2008 this special tool replaces panel wedge 00 9 317 (different material)
Included in the tool or work	0 490 527
Storage location	Individual
Replaced by	
In connection with	
SI-Number	41 01 09 (507)





Special tools required:

- 00 9 325

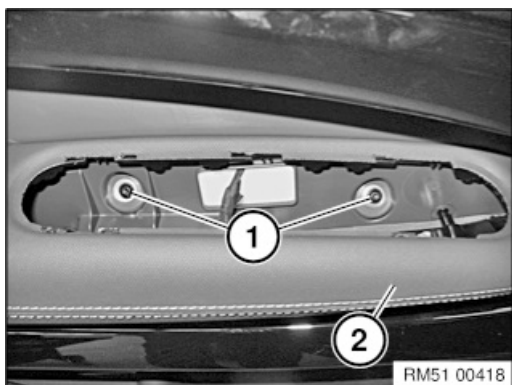


When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



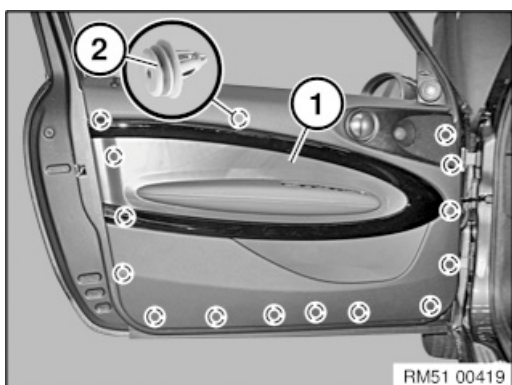
Necessary preliminary tasks:

- Remove the handle recess



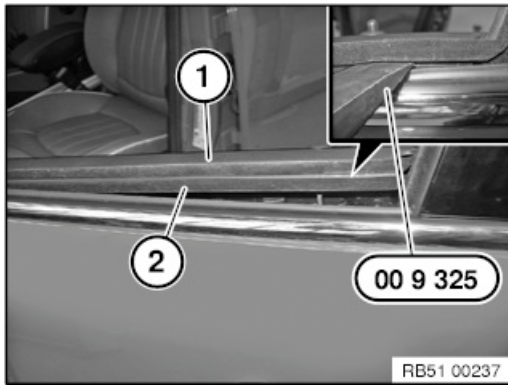
Release the screws (1) from door trim panel (2).

Tightening torque 51 41 1AZ.



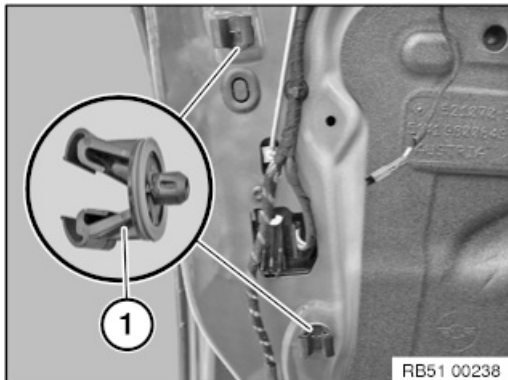
Detach the clips (2) from the door trim panel (1) with special tool 00 9 325 .





If necessary, open the window glass completely.

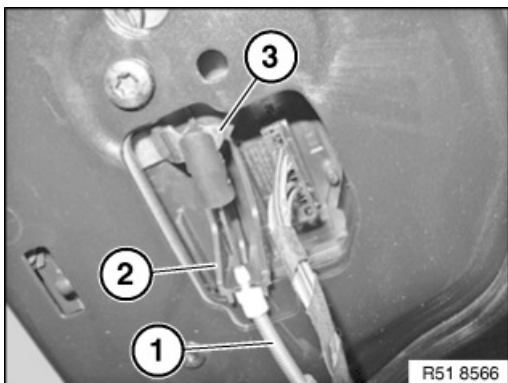
Use special tool 00 9 325 to lift out the door trim panel (1) including weather strip (2) upward (also see next work step).



Note:

Door trim panel shown already removed for clarity.

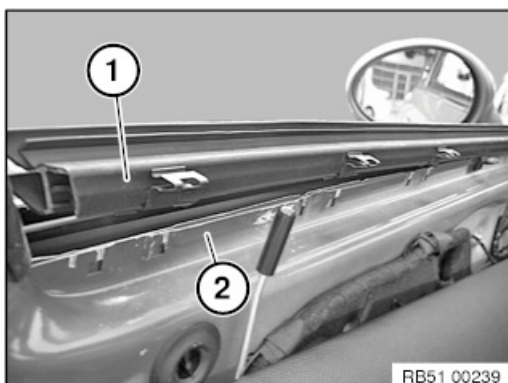
Lift out the door trim panel until the door trim panel unclips from the upper and lower clip (1).



Disengage Bowden cable (1) for inside door handle, first at counter support (2) and then at door lock (3).

Unlock all plug connections and disconnect.

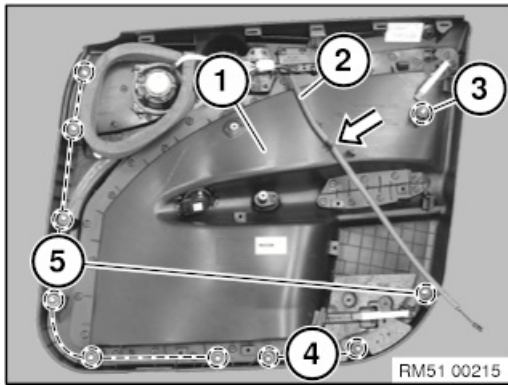
Unclip wiring harness from door trim panel.



Installation note:

Unclip the weather strip (1) from the door trim panel and mount correctly on the window cavity (2).





Installation note:

Correctly attach Bowden cable (2).

Remove the remaining clip (3) from the inner door panel and clip it in the door trim panel (1).

Renew faulty and/or missing clips.

Note:

Clips (4) are blue, remaining clips (3 and 5) are white.



Installation note:

After assembling the door trim panel proceed as follows:

- Open side window
- Check function of inside door handle
- Lock with ignition key
- Check for ease of movement on locking button linkage
- If necessary, align linkage



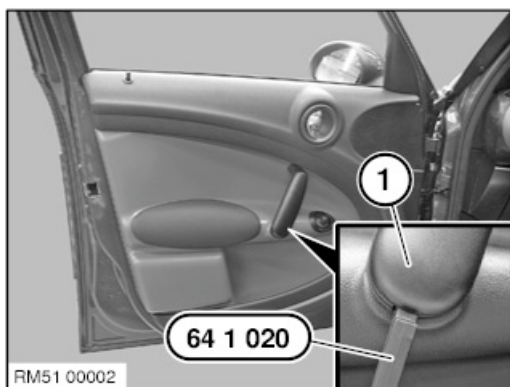


Special tools required:

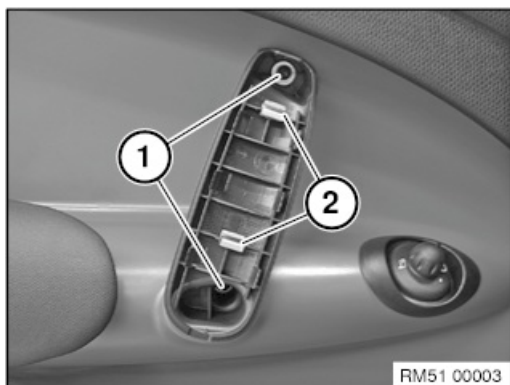
- 64 1 020
- 00 9 325



When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



Press off cover (1) on the door handle with special tool 64 1 020 and remove.

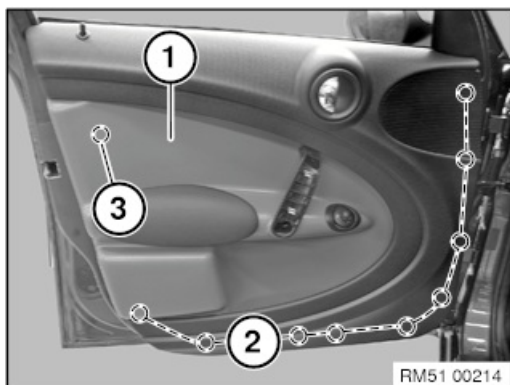


Release screws (1).

Tightening torque 51 41 1AZ.

Installation note:

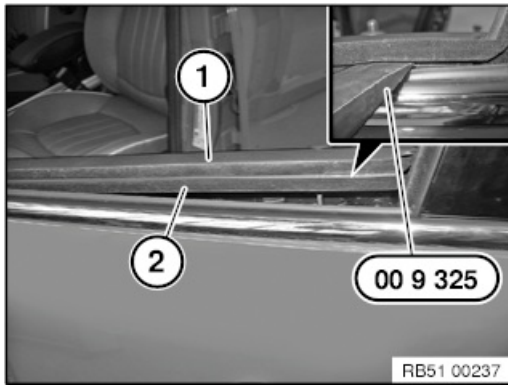
Retaining clips (2) must not be missing or damaged.



Unclip door trim panel (1) at marked positions (2) by means of special tool 00 9 325 .Note:

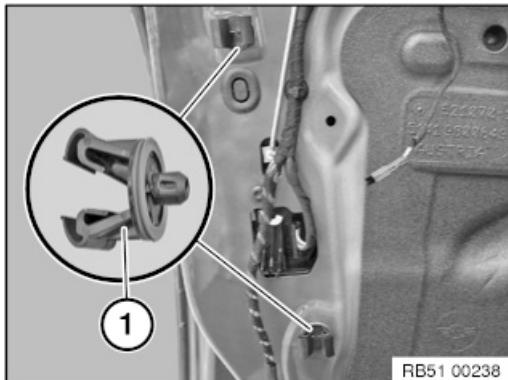
During the next operation, the clip (3) will be unclipped from the door trim panel and remains in the inner door panel.





If necessary, open the window glass completely.

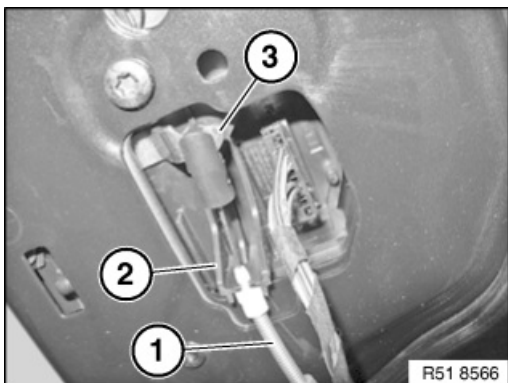
Use special tool 00 9 325 to lift out the door trim panel (1) including weather strip (2) upward (also see next work step).



Note:

Door trim panel shown already removed for clarity.

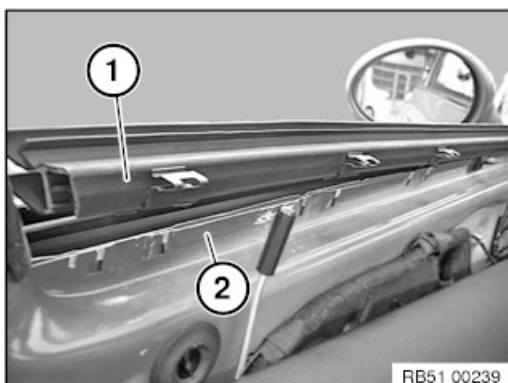
Lift the door trim panel out until the door trim panel unclips from the upper and lower mounting clip (1).



Disengage Bowden cable (1) for inside door handle, first at counter support (2) and then at door lock (3). Unlock all plug connections and disconnect.

Unclip wiring harness from door trim panel.

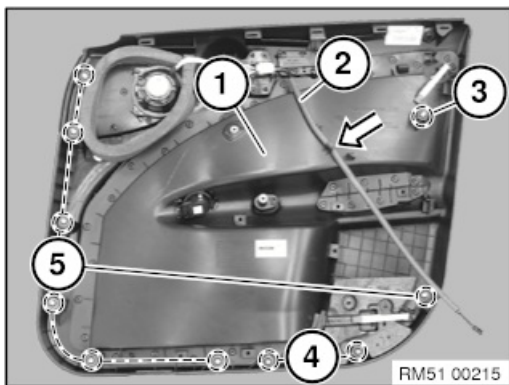
Set down door trim panel.



Installation note:

Unclip the weather strip (1) from the door trim panel and mount correctly on the window cavity (2).





Installation note:

Correctly attach Bowden cable (2).

Remove the remaining clip (3) from the inner door panel and clip it in the door trim panel (1).

Renew faulty and/or missing clips.

Note:

Clips (4) are blue, remaining clips (3 and 5) are white.



Installation note:

After assembling the door trim panel proceed as follows:

- Open side window
- Check function of inside door handle
- Lock with ignition key
- Check for ease of movement on locking button linkage
- If necessary, align linkage



51 41 000 Removing and installing left or right front door trim panel \ PREMIUM

PRELIMINARY WORK

1 – Removing the handle recess in the front door trim panel

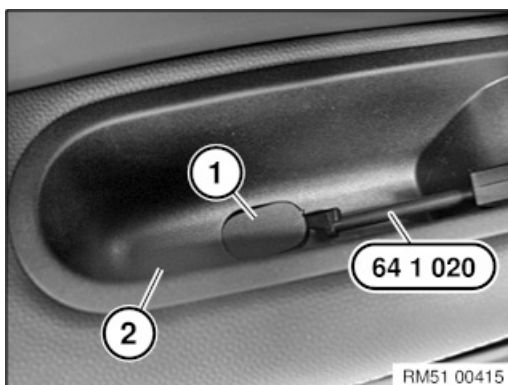


RISK OF DAMAGE

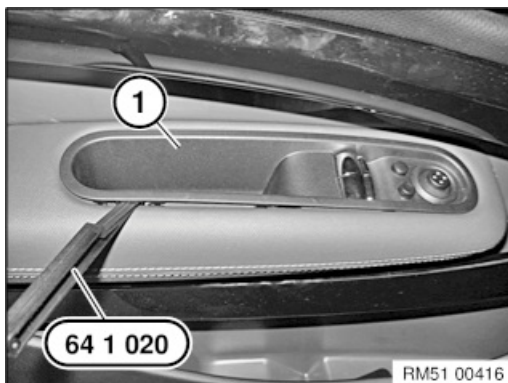
Scratches.

Tools and sharp-edged components can cause scratches.

- Protect working area.
- Handle tools and components carefully.



- Unclip the cover (1) using special tool [0 496 569 \(00 9 325\)](#) from the handle recess (2).
- Release screw underneath.



- Start at the rear and unclip the handle recess (1) using special tool [0 496 569 \(00 9 325\)](#).
- Disconnect the associated plug connection and remove the handle recess (2).

MAIN WORK

2 – Removing the front door trim panel on the left or right (up to 11/2012)



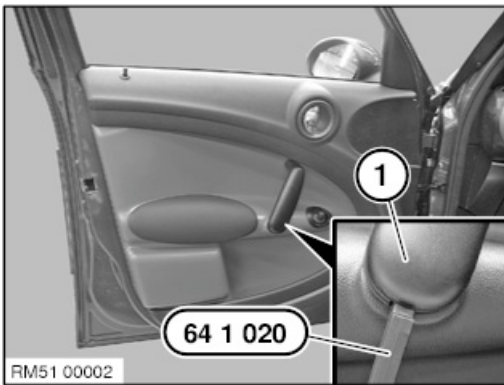
RISK OF DAMAGE

Scratches.

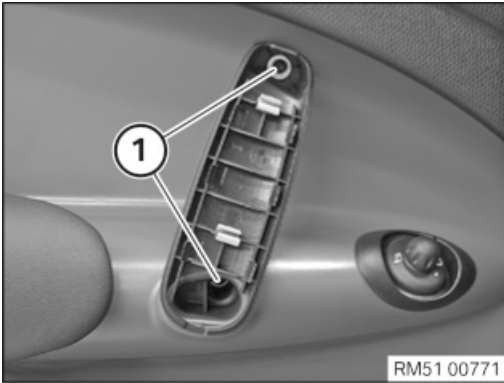
Tools and sharp-edged components can cause scratches.

- Protect working area.
- Handle tools and components carefully.

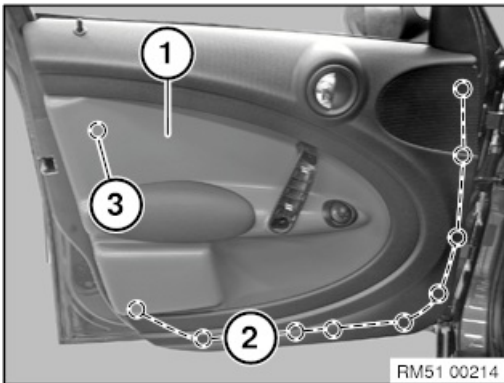




- Lever off and remove cover (1) on the door handle with the special tool [0 493 681 \(64 1 020\)](#).

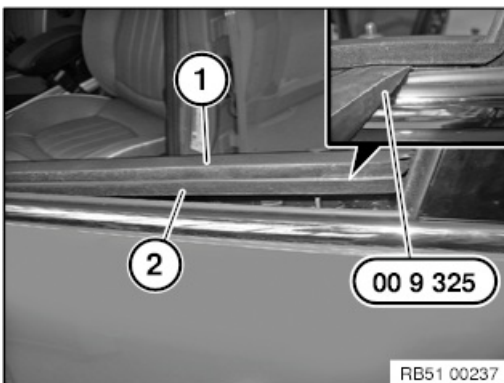


- Loosen screws (1).

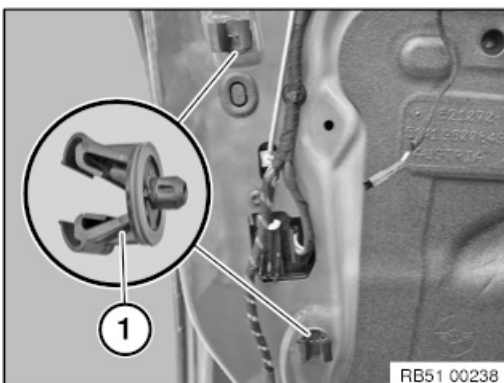


- Unclip the door trim panel (1) at the marked positions (2) with the special tool [0 496 569 \(00 9 325\)](#).

The clip (3) is unclipped from the door trim panel and remains on the inner door panel.



- Completely open the window glass.
- Lever out the [0 496 569 \(00 9 325\)](#) door trim panel (1) including the weather strip (2) upward from outside with the special tool.

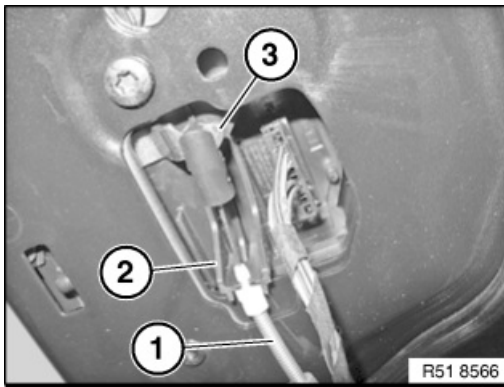


NOTICE

For a better overview the removed condition is shown here.

- Lever up the door trim panel till the door trim panel is released from the upper and lower clip (1).





- Detach the Bowden cable (1) of the inside door handle at the counter support (2).
- Detach the Bowden cable (1) of the inside door handle at the door lock (3).
- Unlock all plug connections and disconnect.
- Unclip the vehicle wiring harness at the door trim panel.
- Remove door trim panel.

3 – Removing the front door trim panel on the left or right (from 11/2012)

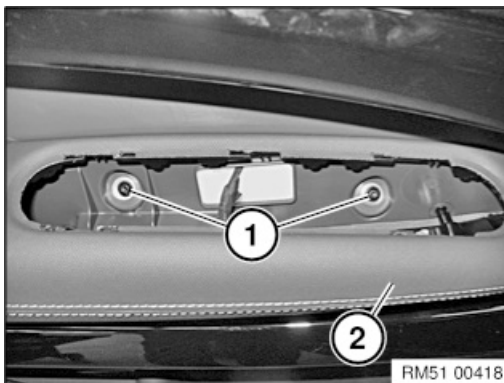


RISK OF DAMAGE

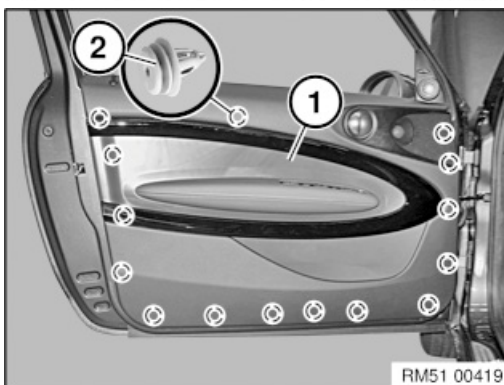
Scratches.

Tools and sharp-edged components can cause scratches.

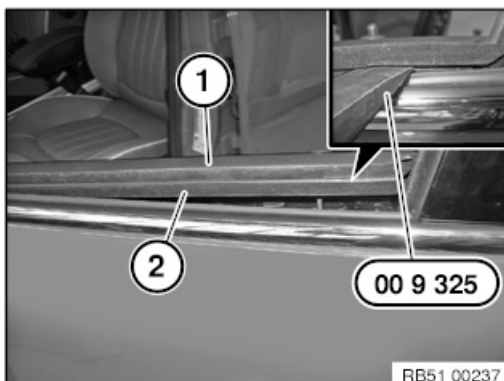
- Protect working area.
- Handle tools and components carefully.



- Release screw (1) from the door trim panel (2).

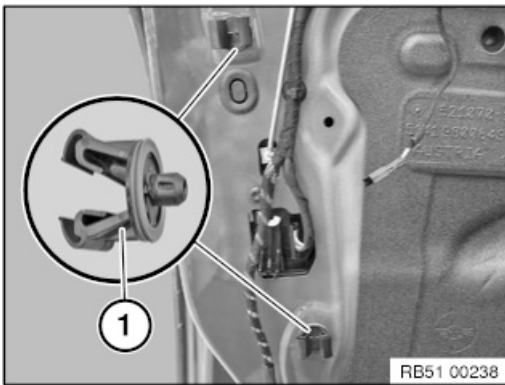


- Release the door trim panel (1) with the special tool [0 496 569 \(00 9 325\)](#) from the clips (2).



- Completely open the window glass.
- Lever out the [0 496 569 \(00 9 325\)](#) door trim panel (1) including the weather strip (2) upward from outside with the special tool.

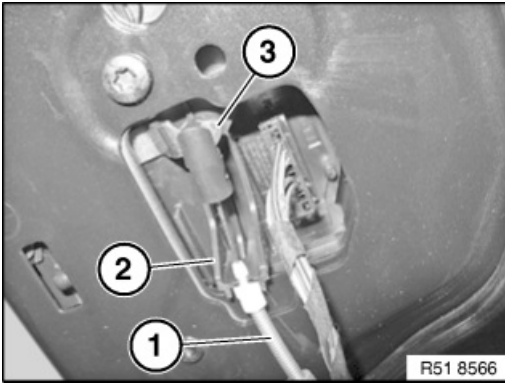




NOTICE

For a better overview the removed condition is shown here.

- Lever up the door trim panel till the door trim panel is released from the upper and lower clips (1).
- Detach the Bowden cable (1) of the inside door handle on the counter support (2).
- Detach the Bowden cable (1) of the inside door handle at the door lock (3).
- Unlock all plug connections and disconnect.
- Unclip the vehicle wiring harness at the door trim panel.
- Remove door trim panel.



4 – Installing the front door trim panel on the left or right (from 11/2012)

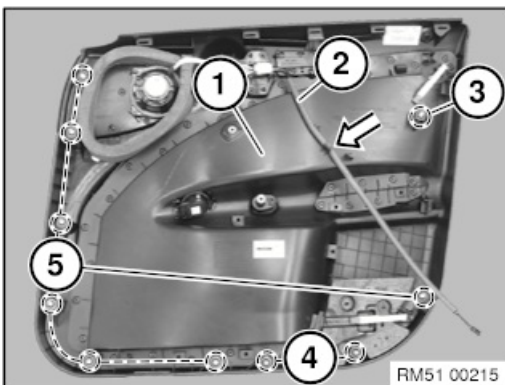


RISK OF DAMAGE

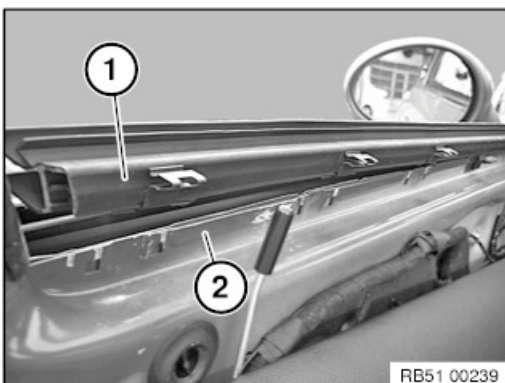
Scratches.

Tools and sharp-edged components can cause scratches.

- Protect working area.
- Handle tools and components carefully.

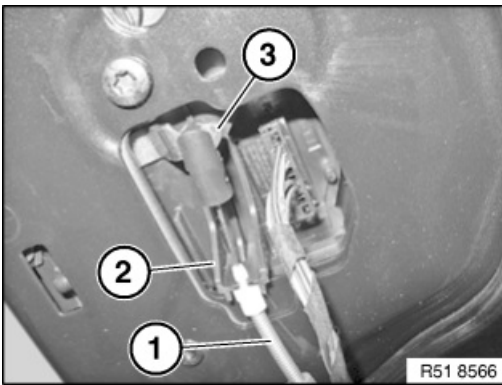


- Correctly attach the Bowden cable (2).
- If necessary, disassemble the remaining clip (3) on the inner door panel and clip it on the door trim panel (1).
- Check clips for damage, renew faulty or missing clips, if required.
The clips (4) are blue, the clips (3) and (5) are white.

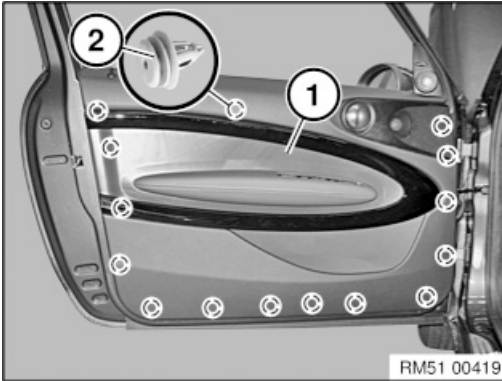


- Unclip the weather strip (1) from the door trim panel.
- Install the weather strip (1) on the window cavity (2).

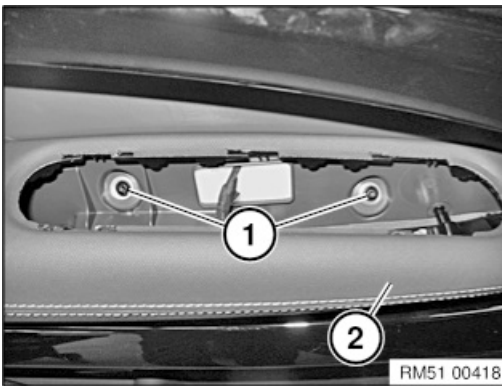




- Attach the Bowden cable (1) of the inside door handle at the door lock (3).
- Attach the Bowden cable (1) on the counter support.
- Connect all connectors.
- Clip in the vehicle wiring harness on the door trim panel.



- Engage the door trim panel (1) in the clips (2).



- Tighten the screw (1) in the door trim panel (2).

• **After installation of the door trim panel:**

- Open side window.
- Check the function of the inside door handle.
- Lock the door with the ignition key.
- Check whether the linkage of the locking button can move freely and align linkage if necessary.

5 – Installing the front door trim panel on the left or right (up to 11/2012)



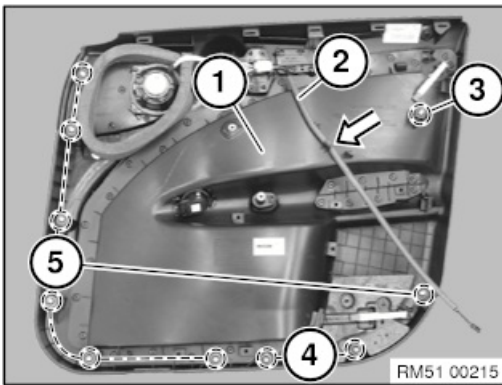
RISK OF DAMAGE

Scratches.

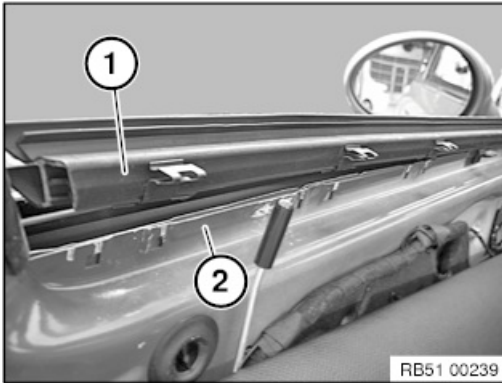
Tools and sharp-edged components can cause scratches.

- Protect working area.
- Handle tools and components carefully.

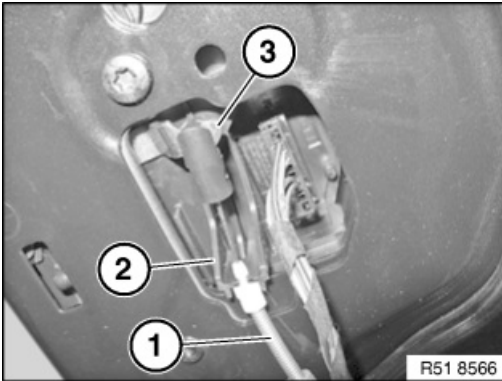




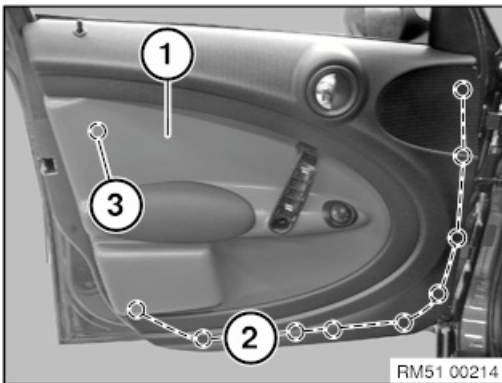
- If necessary, disassemble the remaining clip (3) on the inner door panel and clip it on the door trim panel (1).
- Check clips for damage, renew faulty or missing clips, if required.
The clips (4) are blue, the clips (3) and (5) are white.
- Correctly attach the Bowden cable (2).



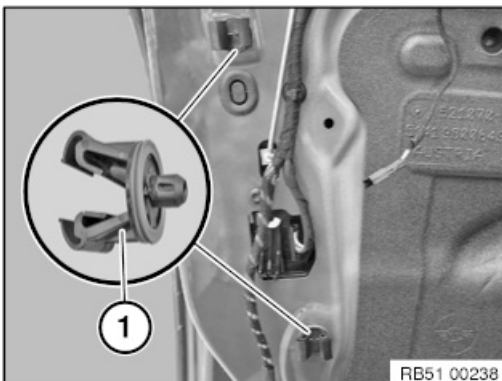
- Unclip the weather strip (1) from the door trim panel.
- Install the weather strip (1) on the window cavity (2).



- Attach the Bowden cable (1) of the inside door handle at the door lock (3).
- Attach the Bowden cable (1) on the counter support.
- Connect all connectors.
- Clip in the vehicle wiring harness on the door trim panel.

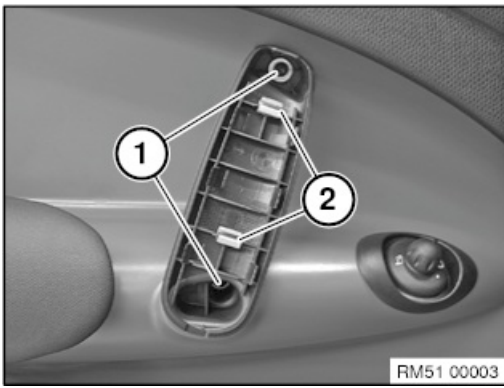


- Clip the door trim panel (1) at the top into the clamps of the weather strip.
- Press the door trim panel (1) at the marked positions (2) and (3).



- Audibly engage the door trim panel in the clips (1).



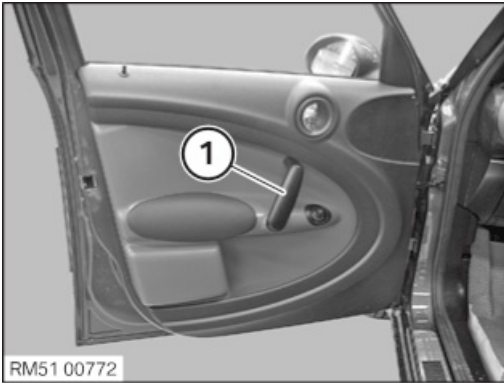


- Tighten the screws (1).

Door trim panel

4,2 Nm

- Check retaining clips for damage, renew faulty or missing retaining clips if required (2).



- Install trim (1).

• After installation of the door trim panel:

- Open side window.
- Check the function of the inside door handle.
- Lock the door with the ignition key.
- Check whether the linkage of the locking button can move freely and align linkage if necessary.



6 – Installing the handle recess in the front door trim panel

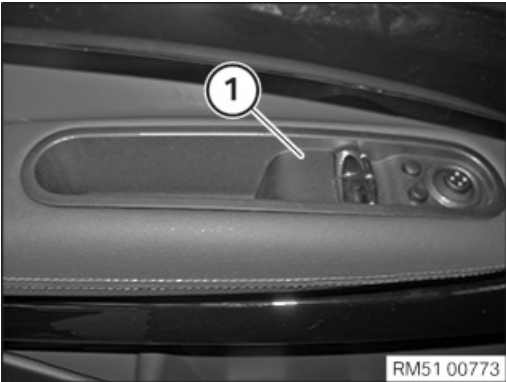


RISK OF DAMAGE

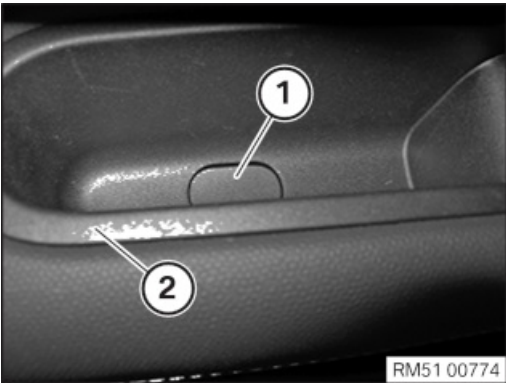
Scratches.

Tools and sharp-edged components can cause scratches.

- Protect working area.
- Handle tools and components carefully.



- Connect associated plug connections.
- Start at the front and clip in the handle recess (1).
- Tighten down screw.



- Clip in the cover (1) into the handle recess (2).

Additional Information

Overview of Tightening Torques

Door trim panel	Used in step 5
	4,2 Nm

Overview of Special Tools



0 496 569 (00 9 325) Wedge



Common

Used in step 123

Usage (Panel wedge) From 11/2008 this special tool replaces panel wedge 00 9 317 (different material)

Included in the tool or work 0 490 527

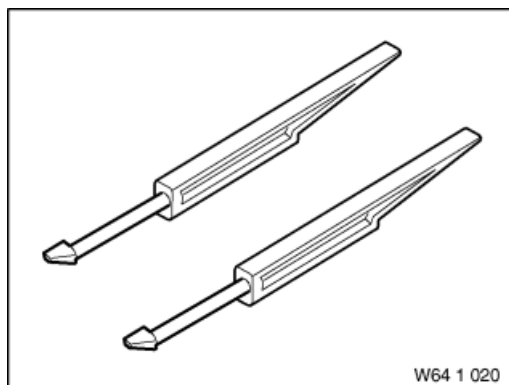
Storage location Individual

Replaced by

In connection with

SI-Number 41 01 09 (507)

0 493 681 (64 1 020) Hook



Common

Used in step 2

Usage (release hook) For releasing and removing fresh air grille. For removing various covers.

Included in the tool or work

Storage location C2

Replaced by

In connection with

SI-Number 01 15 99 (483)



51 41 017 Removing and installing/replacing cover on door handle (inside), front left or right

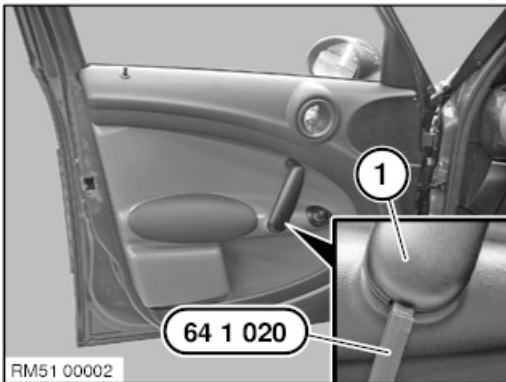


Special tools required:

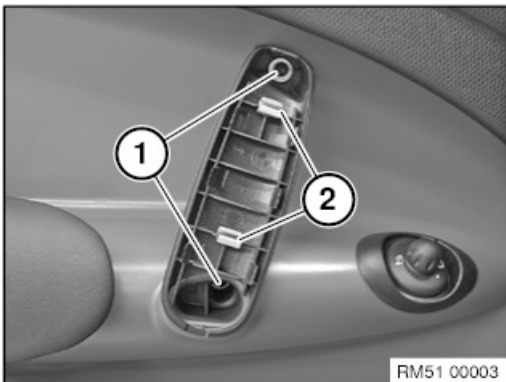
- 64 1 020



When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



Lever out cover (1) on the door handle with special tool 64 1 020 and remove.



Installation note:

Retaining clips (2) must not be missing or damaged.



51 41 ... Removing and installing/replacing front (inside) left or right door opener cover

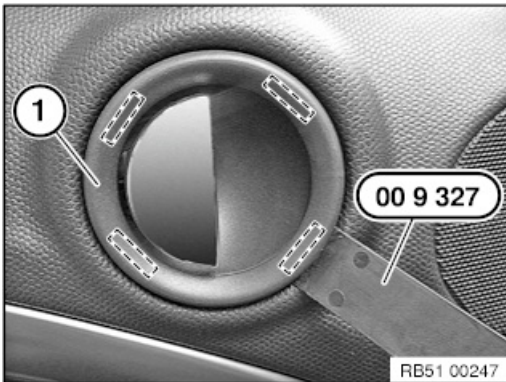


Special tools required:

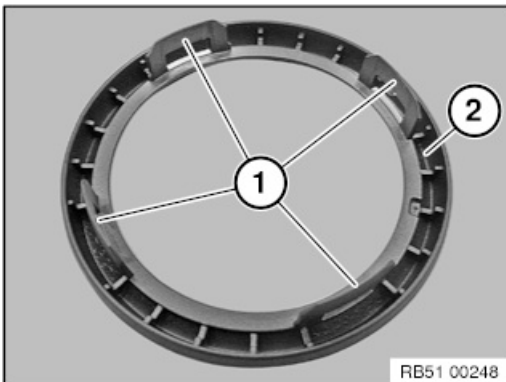
- 00 9 327



When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



Lever out and remove the door opener cover (1) with special tool 00 9 327 , as shown.



Installation note:

Retaining tabs (1) on door opener cover (2) must not be missing or damaged.



51 48 060 Removing and installing/replacing sound insulation in left or right front door



Important!

Instructions for sound insulation are an essential part of these repair instructions and must be followed without fail.

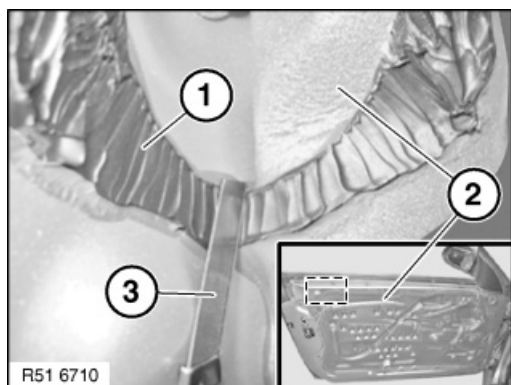
Do not detach sound insulation in jerks (risk of damage).

Ensure watertightness of sound insulation after every repair (water ingress).



Necessary preliminary tasks:

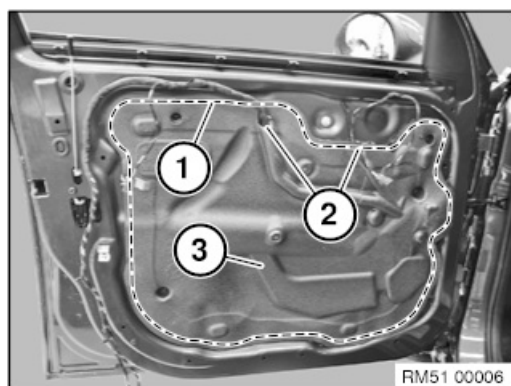
- Remove door trim panel



Important!

When cutting through sealing bead (1), do not damage sound insulation (2) and if necessary cable.

With a suitable sharp cutting tool (3) cut through sealing bead (1) of sound insulation (2) in the area to be detached.



Position of sealing bead (1).

Feed out sound insulation (3) at cables (2) and remove.



Clean adhesive area with adhesive remover (sourcing reference: BMW Parts Department).

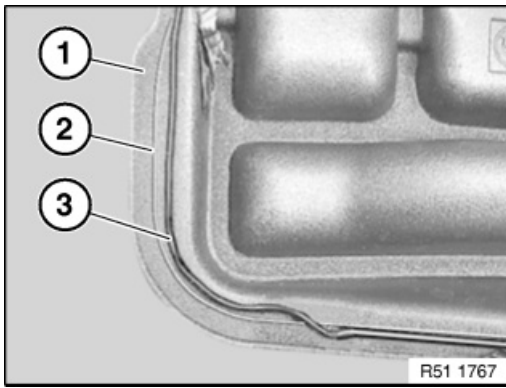
Air drying time: 1 minute

Important!

Bonding surface must be dry and free of dust and grease.

Once it has been cleaned, do not touch the adhesive area with bare hands.





Note:

A mark (2) is provided all round on the sound insulation (1).

Butyl rope (3) rests on or inside the marking (2).



Replacement

Lay 6 mm dia. butyl rope (sourcing reference: BMW Parts Department) in specified adhesive area.

Heat butyl rope (hot air blower) and press down firmly on sound insulation all round.

Contact pressure with hand roller: approx. 20 N/cm²

Manual contact pressure: approx. 10 N/cm²

Note:

Firm thumb pressure has approx. 30 N/cm²



51 41 001 Replacing left or right front door trim panel

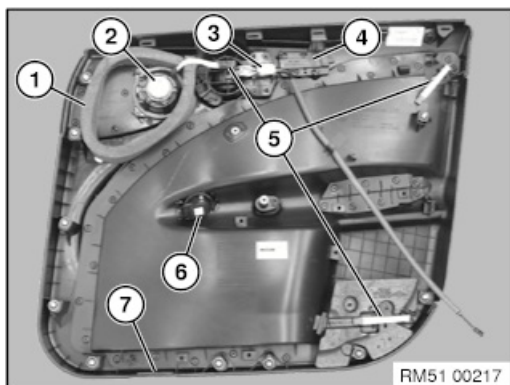


When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



Necessary preliminary tasks:

- Remove front door trim panel



The following components need to be remounted:

- Foam part (1)
- Speaker (2)
- Interior door opener (3)

Depending on version:

- Interior aerial (4)
- LED for door panel lighting (5)
- Footwell light/light cover aperture (7)
- Switch for exterior mirror (6)



51 48 ... Notes for bonding sound insulation (SI), doors



Special tools required:

- 51 0 300

Attention!

Do not yank at the sound insulation (risk of damage).

General:

Sound insulation is bonded to the inner door panel.

Bonded sound insulation must not be subjected to load (e.g. leak test) before 5 hours have elapsed.

On-the-job safety:

When working with bonding products (adhesive, cleaning agent, etc.):

- Wear safety goggles, protective gloves and if necessary an apron.
- Ensure the area is well ventilated.
- Change work clothing contaminated with adhesive immediately.
- Change work clothing contaminated with solvents and swelling agents immediately (keep spare work clothing on hand).
- Take skin protection measures, provide washing facilities including hot water, use silicone-free skin creams.
- Always keep an eye douche on hand, change the water regularly (once a month).
- Comply with the relevant safety regulations.

Handling adhesive area on inner door panel:

Adhesive	Cleaning
a. Butyl bead applied to sound insulation with protective film	a. Cleaning agent R2 <i>Under no circumstances: paint thinning</i>
b. Butyl mini-round profile \varnothing 4 mm from the roller	b. Carry out bonding only after an air drying time \geq 1 min. Air drying time may be omitted if the entire bonding surface is wiped with a dry cloth
c. Butyl round profile \varnothing 6 mm from the roller	c. After cleaning, the bonding surface may not be touched with hands or fouled again

Repair in area of sound insulation, door:

Repair	<ul style="list-style-type: none">• Cut the butyl rope between the sound insulation and the inner door panel with a sharp knife• After the repair is finished, position a new butyl rope \varnothing 4 mm directly on the original adhesive bead• Heat the butyl bead with a standard hot air blower until the butyl rope strings when touched slightly. Do not damage the sound insulation in the process• Press on with special tool 51 0 300. Perform this work extremely carefully because the increased amount of adhesive requires contact pressure of \geq 20 N/cm² (compared to firm thumb pressure \sim 30 N/cm²)• Visually check the adhesive bead and its compression (no capillaries or broken adhesive bead permitted)
--------	--



in the event of
damaged sound
insulation or
leakage

- In the cases mentioned, the complete sound insulation must be replaced. After removing the sound insulation, removal all butyl remnants from the inner door panel. Apply 6 mm \varnothing butyl rope to new sound insulation
- Press on with special tool 51 0 300. Contact pressure $\geq 20 \text{ N/cm}^2$ (compare to firm thumb pressure $\sim 30 \text{ N/cm}^2$)

The sound insulation must be bonded watertight below the door lock:

- Flat bonding surface required all round.
- No bonding in the event of moisture (e.g. condensation, etc.).
- Bonding area must not show any traces of adhesion-reducing residues (e.g. separating agents, greases, oils, paraffins, plastisols, cavity wax, polishing dust residues, etc.).
- Remove the protective film directly before joining (under no circumstances remove earlier, since the butyl, because of its stickiness, will very quickly pick up adhesion-reducing dirt contaminants).
- The sound insulation must be attached with positional accuracy to the inner door panel because it will no longer be possible to change the position without damaging the butyl bead.
- With repainted areas, the maximum permitted temperature of 90°C may not be exceeded in the area of the sound insulation. Otherwise, the sound insulation must be removed (and replaced, if necessary).

Expiry date of adhesive:

24 months, see label on packaging.

Disposal of the cleaning cloth:

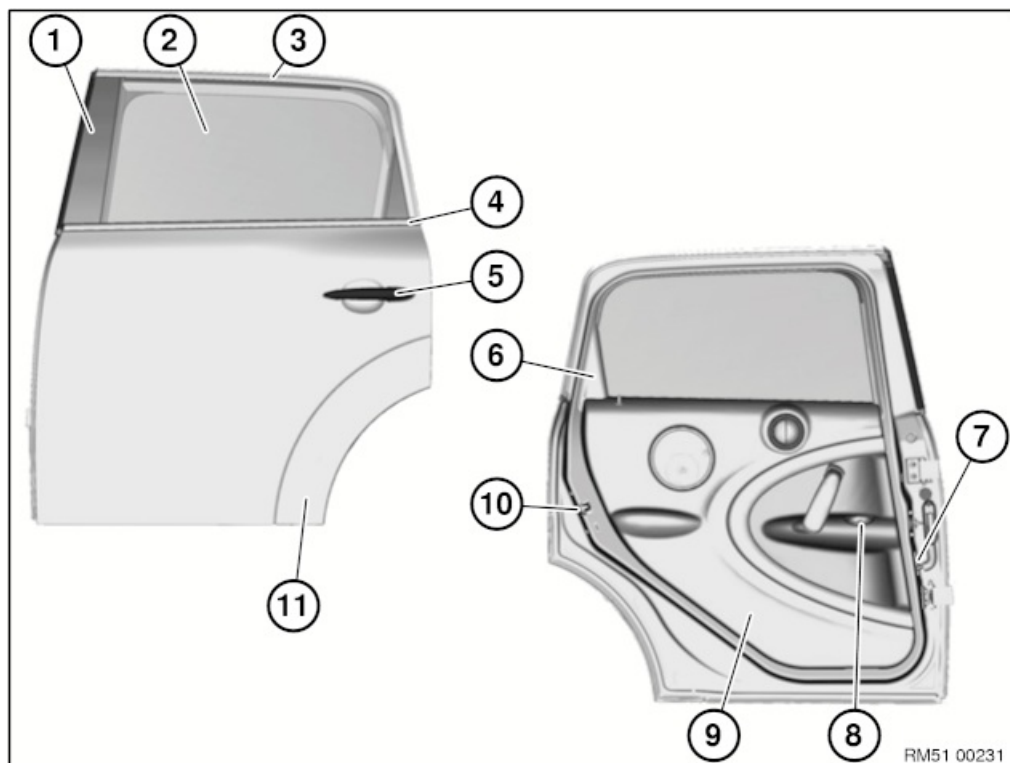
Cleaning cloths and cleaning agent residues are hazardous waste (see also safety data sheet).

Disposal of adhesive:

Hazardous waste (see also safety data sheet).



51 00 .. Overview of rear door



- | | |
|--|--------------------------------------|
| 1 Trim on window frame | 7 Door brake |
| 2 Door window glass | 8 Rocker switch for window operation |
| 3 Rubber guide for door window glass | 9 Door trim panel |
| 4 Window cavity cover strip | 10 Door lock |
| 5 Outside handle | 11 Wheel arch cover |
| 6 Window frame cover (refer to rubber window seal for door window) | |

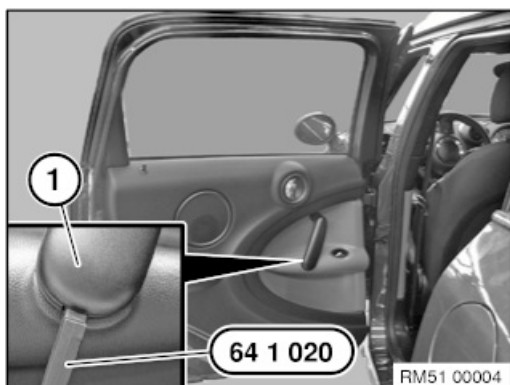


**Special tools required:**

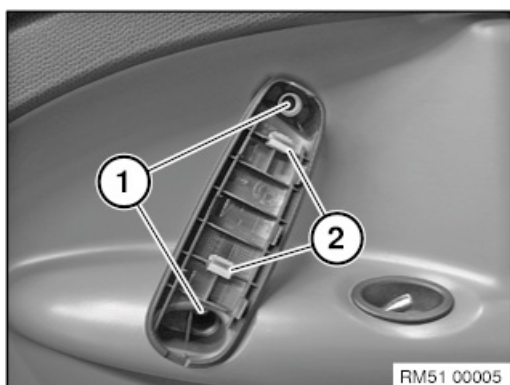
- 64 1 020
- 00 9 325



When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



Press off cover (1) on the door handle with special tool 64 1 020 and remove.

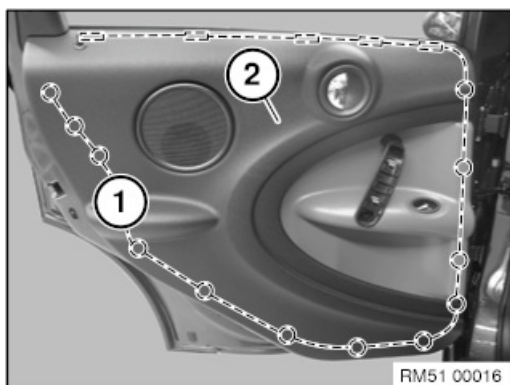


Release screws (1).

Tightening torque 51 42 1AZ.

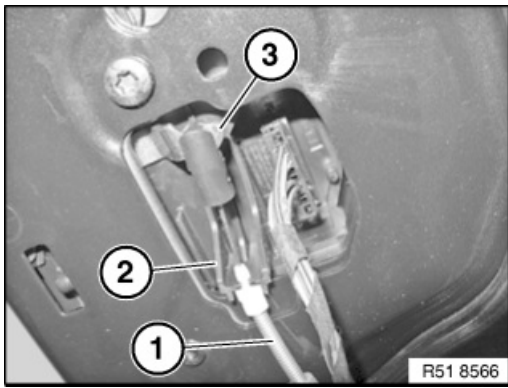
Installation note:

Retaining clips (2) must not be missing or damaged.



Clip out door trim panel (2) at marked position (1) with special tool 00 9 325 .

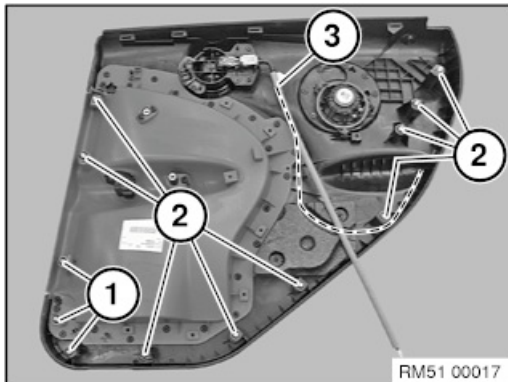




Disengage Bowden cable (1) for inside door handle, first at counter support (2) and then at door lock (3). Unlock all plug connections and disconnect.

Clip out wiring harness at door trim panel.

Set down door trim panel.



Installation note:

Renew faulty or missing clips (1) and (2).

Clips (1) = blue

Clips (2) = white

Install Bowden cable (3) into correct position again.



Installation note:

After assembling the door trim panel proceed as follows:

- Open side window
- Check function of inside door handle
- Lock with ignition key
- Check for ease of movement on locking button linkage
- If necessary, align linkage





Necessary preliminary tasks:

- Remove rear door trim panel

Important!

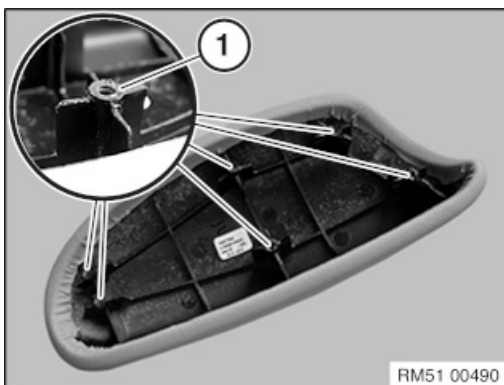
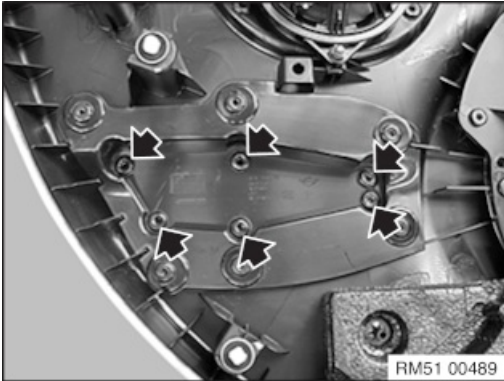
Risk of damage!

So that the contact face is not damaged, only drill as far as contact face.

Drill out marked spot-welds with 8 mm dia. spot-weld drill bit.

Remove armrest from outside.

Remove welding residues on door trim panel with a scalpel.



Saw off all welding pins (1) to a max. protrusion of 1 mm.



Insert armrest in door trim panel and fix with screws. *Installation note:* Welding pins Must not protrude above door trim panel.



51 42 017 Removing and installing/replacing cover on door handle (inside), rear left or right

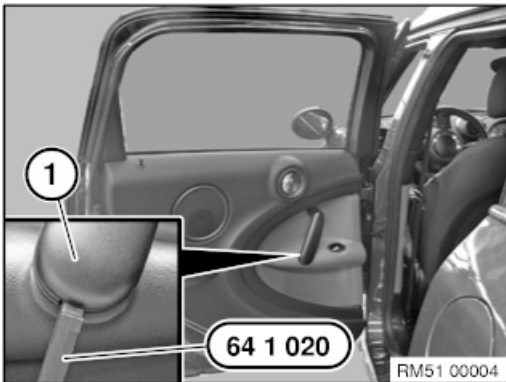


Special tools required:

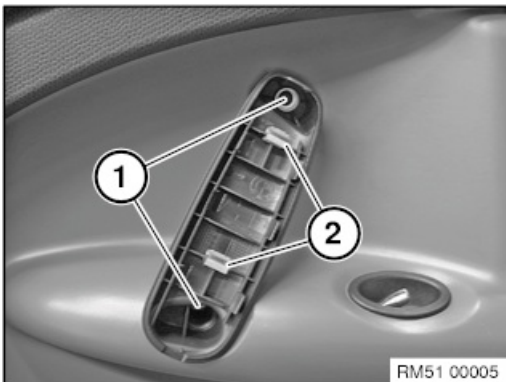
- 64 1 020



When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



Lever out cover (1) on the door handle with special tool 64 1 020 and remove.



Installation note:

Retaining clips (2) must not be missing or damaged.



51 48 070 Removing and installing/replacing sound insulation on left or right rear door



Important!

Instructions for sound insulation are an essential part of these repair instructions and must be followed without fail.

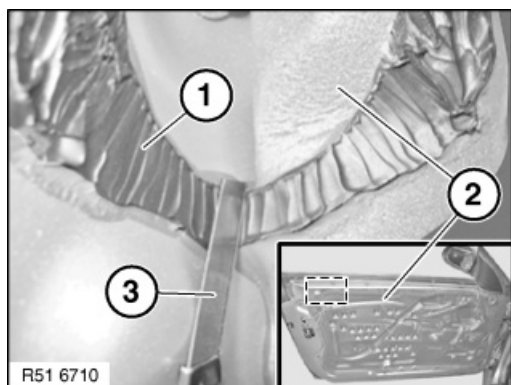
Do not detach sound insulation in jerks (risk of damage).

Ensure watertightness of sound insulation after every repair (water ingress).



Necessary preliminary work:

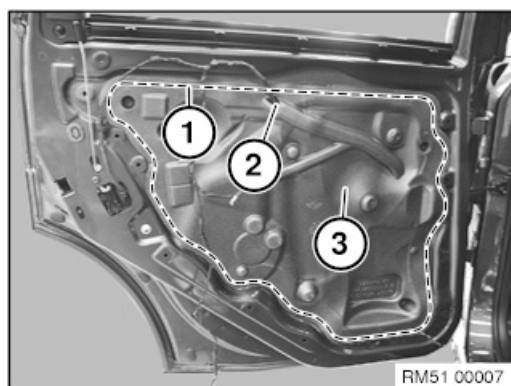
- Remove rear door trim panel



Important!

When cutting through sealing bead (1), do not damage sound insulation (2) and if necessary cable.

With a suitable sharp cutting tool (3) cut through sealing bead (1) of sound insulation (2) in the area to be detached.



Position of sealing bead (1).

Feed out sound insulation (3) at cable (2) and remove.



Clean bonding area with adhesive remover (sourcing reference: BMW Parts Department).

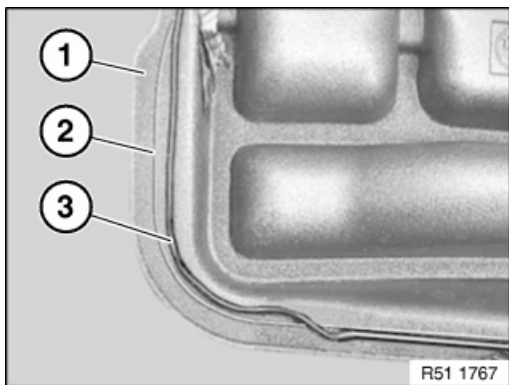
Air drying time: 1 minute

Important!

Adhesive areas must be dry and free of dust and grease.

Once it has been cleaned, do not touch the adhesive area with bare hands.





Note:

A marking (2) is provided all round on the sound insulation (1).

Butyl rope (3) rests on or inside the marking (2).



Replacement

Lay 6 mm dia. butyl rope (sourcing reference: BMW Parts Department) in specified adhesive area.

Heat butyl rope (hot-air blower) and press down firmly on sound insulation all round.

Contact pressure with hand roller: approx. 20 N/cm²

Manual contact pressure: approx. 10 N/cm²

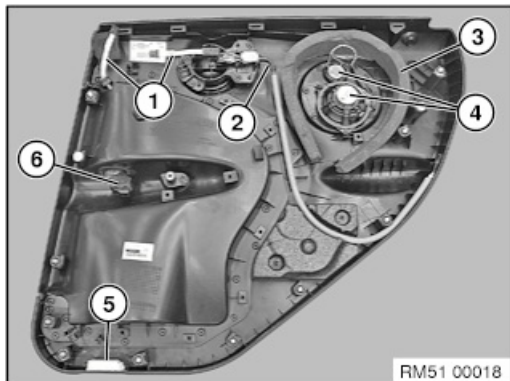
Note:

Firm thumb pressure has approx. 30 N/cm²



**Necessary preliminary tasks:**

- Remove rear door trim panel

Swap over the following parts according to version:

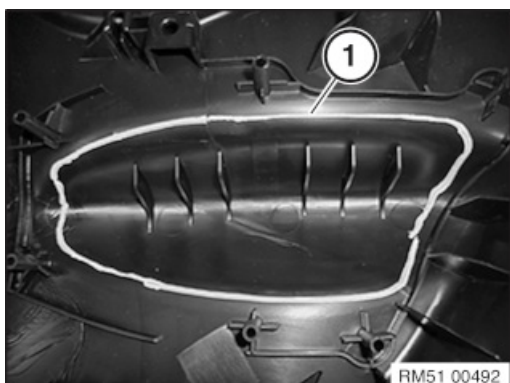
- Bowden cable (2)
- Speaker (4)
- Rocker switch for side window operation (6)
- Foam part (3)

For version with light package only:

- LED for door panel lighting (1)
- Footwell light (5)

For version without light package only:

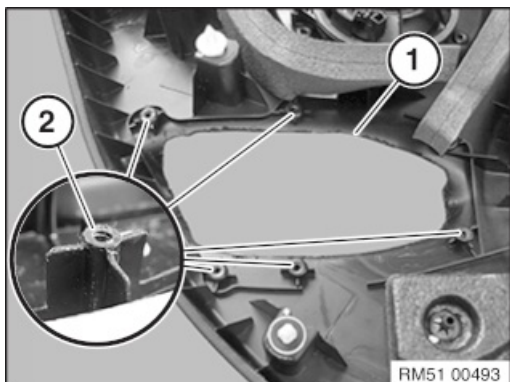
- Light aperture cover (5)

Version with armrest:

Cut out door trim panel along marking (1).

Note:

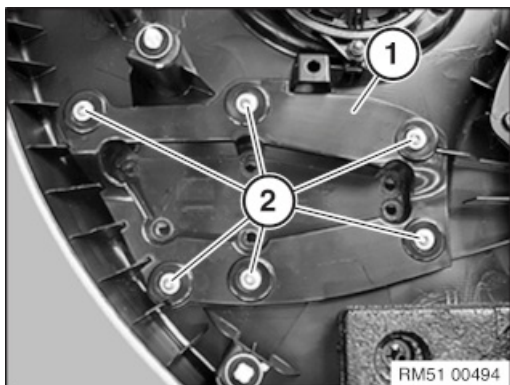
For sawing, use special cutter with oscillating blade.



Smooth off rough edges of cut (1).

Remove all spot-welds (2) to a max. protrusion of 1 mm.





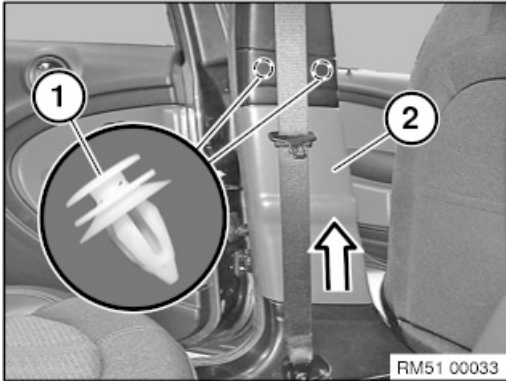
Insert adaptor (1) and fix with bolts (2).
Swap over armrest or fit new armrest.



51 43 150 Removing and installing or replacing trim panel for left or right door post (bottom)



When working on trim panel components, make sure that the sensitive surfaces are not scratched or damaged.

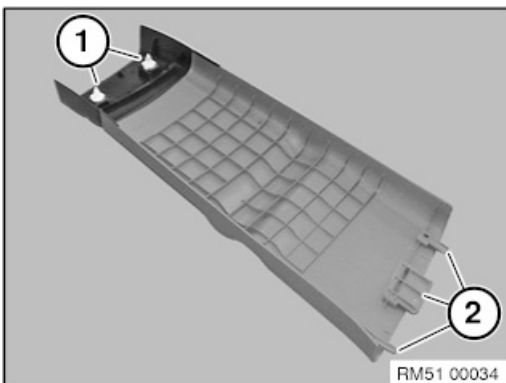


Detach edge protection for front door / behind in the area of the trim panel (2).

Push front seat forwards.

Detach trim panel (2) from clip (1).

Remove trim panel (2) upwards.



Installation note:

Clips (1) and guides (2) must not be damaged.

Make sure edge the edge protection for the front door / rear door is correctly seated.



51 43 251 Removing and installing or replacing trim panel for left or right rear roof pillar (C-pillar)



Special tools required:

- 00 9 325



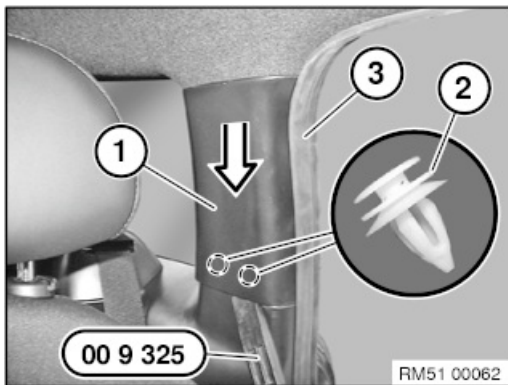
Warning!

Vehicles with head airbags:

Read and comply with safety regulations for working on vehicles with airbag systems.

Important!

Do not use any sharp-edged tools to remove the trim panels (risk of damage to head airbag).

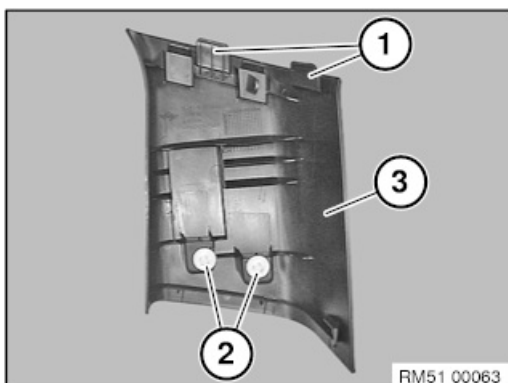


Detach edge protection (3) in area of trim panel (1).

Detach trim panel (1) with special tool 00 9 325 from clip (2).

Remove trim panel (1) downwards.

Installation note: Make sure edge protection (3) is correctly seated.



Installation note:

Guides (1) on trim panel (3) must not be damaged.

Replace clips (2).



51 43 201 Removing and installing or replacing trim panel for roof pillar at front (A-pillar), left or right

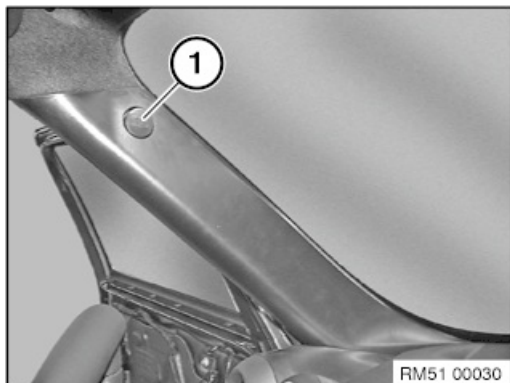


Warning!

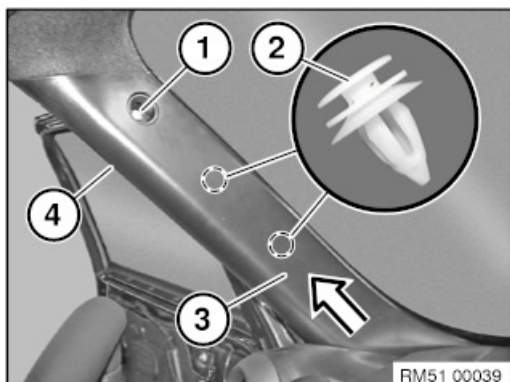
Read and comply with safety regulations for working on vehicles with airbag systems.

Important!

Do not use any sharp-edged tools to remove the trim panel (risk of damage to head airbag).



Lever out protective cap (1).

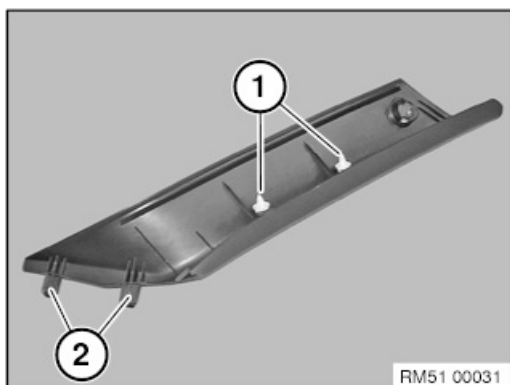


Release screw (1).

Tightening torque 51 43 1AZ.

Detach edge protection (4) in area of trim panel (3).

Undo clips (2) and remove trim panel (3) upwards.



Installation note:

Clips (1) and guide (2) must not be damaged.

Make sure edge protection (4) is correctly seated.

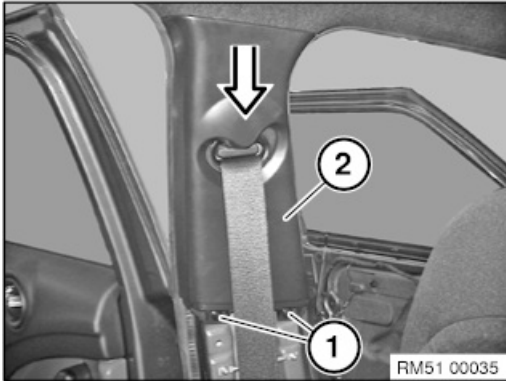


51 43 148 Removing and installing or replacing trim panel on left or right door post (top)



Necessary preliminary work:

- Remove trim panel for door post (bottom)



Detach edge protection for front door / behind in the area of the trim panel (2).

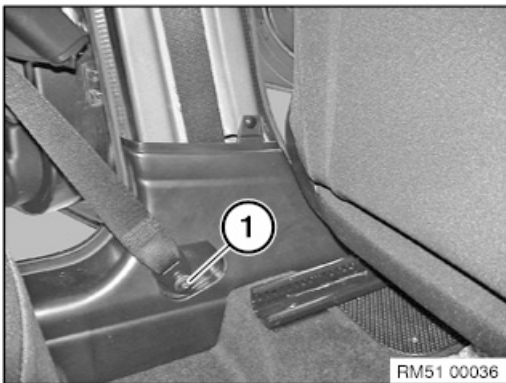
Release expanding rivets (1).

Feed out trim panel (2) downwards and remove.

Installation note:

Replace faulty expanding rivets (1).

Make sure edge the edge protection for the front door / rear door is correctly seated.

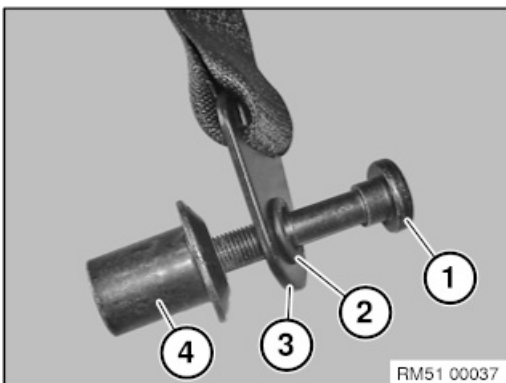


Replacement only:

Release screw (1).

Tightening torque 72 11 4AZ

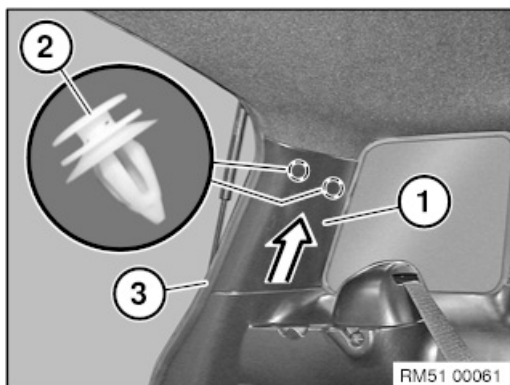
Feed out seat belt strap from trim panel of door post and remove.



1. Screw
2. O-ring
3. Seat belt strap
4. Bush

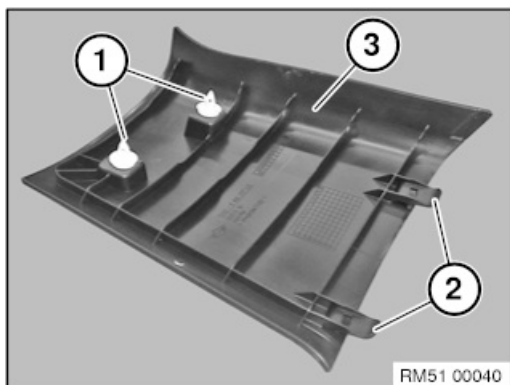


51 43 259 Removing and installing/replacing trim panel for rear roof pillar (D-pillar), left or right



Detach edge protection (3) in area of trim panel (1).
Detach trim panel (1) from clip (2) towards inside.
Remove trim panel (1) upwards.

Installation note: Make sure edge protection (3) is correctly seated.



Installation note:
Replace clips (1).
Guides (2) on trim panel (3) must not be damaged.



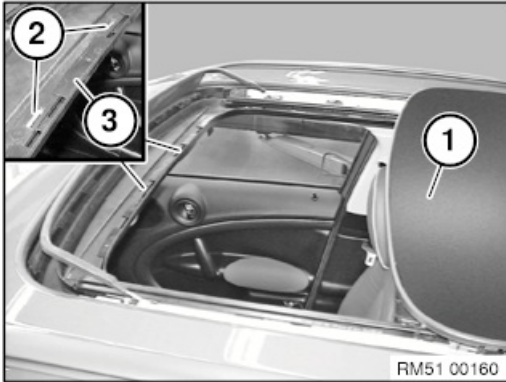
51 44 002 Removing and installing (replacing) headlining (on version without panorama glass roof)



Except for the steps relating to the panorama glass roof, the work is identical to:

Removing and installing (replacing) headlining (with panorama glass roof).



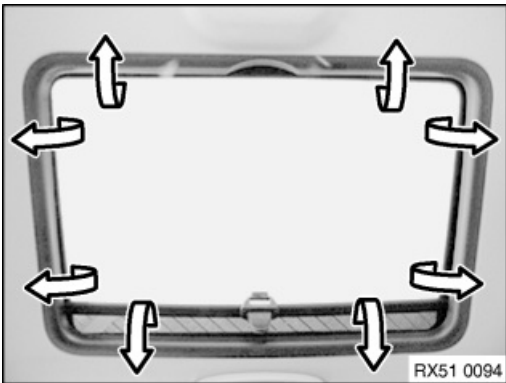


Move glass slide/tilt sunroof panel (1) all the way to the rear.

Unlock latch mechanisms (2) on cover (3).

Installation note:

Ensure catches (2) are correctly seated.



Unclip cover all round from frame and remove. *Installation note:*

Make sure cover is correctly seated on roofliner and sliding sunroof frame.

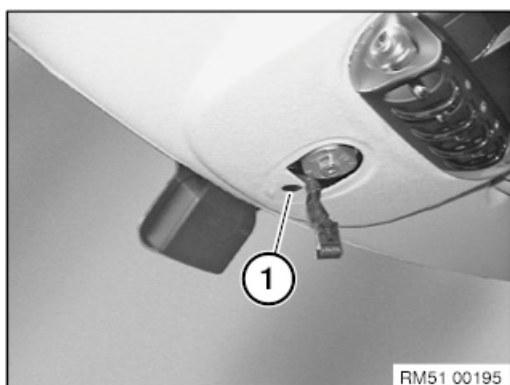


51 44 013 Removing and installing/replacing headlining (version with panorama glass roof)

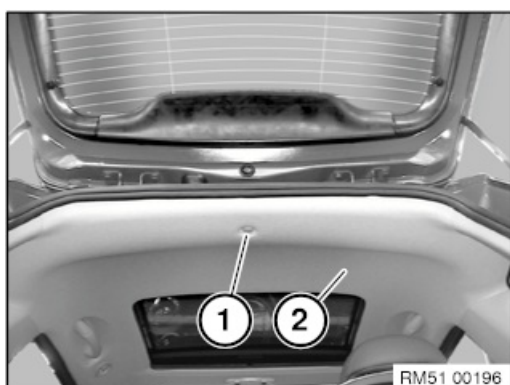


Necessary preliminary tasks:

- Remove trim panel for roof pillar at front (A-pillar) left/right
- Remove all sun visors and counter-supports
- Remove the roof operating facility
- Remove inside mirror
- Release edge protection in area of headlining
- Remove front roofliner cover
- Remove trim panels for door posts
- Remove front/rear grab handles
- Remove interior roof light
- Remove rear roofliner cover
- Remove driver's seat.
- Remove left rear seat
- Remove trim panel for roof pillar at rear (C-pillar) left/right
- Remove trim panel for roof pillar (D-pillar) at left/right
- Partially removing rear centre seat belt



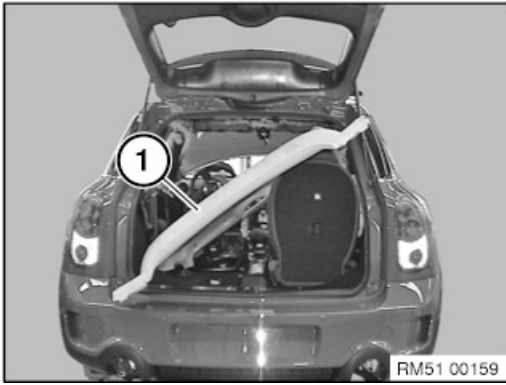
Release expansion rivet (1).



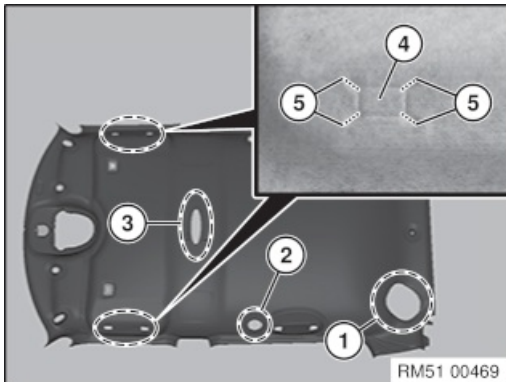
Release expansion rivet (1).

Lay headlining (2) downwards.





Tilt headlining (1) and feed out through luggage compartment lid cutout.

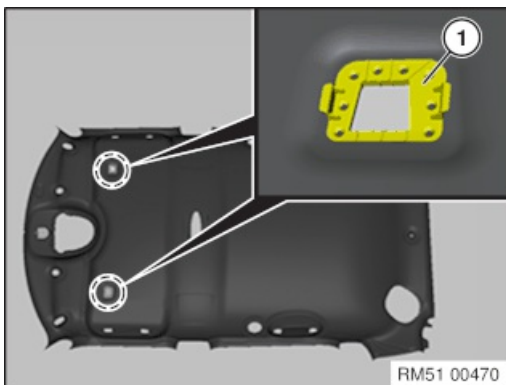


Replacement:

Depending on the version, the apertures below must be cut out afterwards.

- (1) Aperture for seat belt
- (2) Aperture for load area net mounting on left/right
- (3) Aperture for light
- (4) Aperture for handle/sun visor

For apertures (4) only cut out the rectangular part, angled mouldings (5) are not to be cut.



On replacement with microphone version:

Cut out apertures for the microphone along the mouldings.

Bond holder (1) on headlining.



Installation sequence:

1. Secure headlining with edge protection
2. Engage front/rear clips
3. Feed in rubber grommet of inside mirror wiring harness
4. Screw down grab handles at front left and right
5. Screw down grab handles at rear left and right
6. Screw down sun visors and counter supports



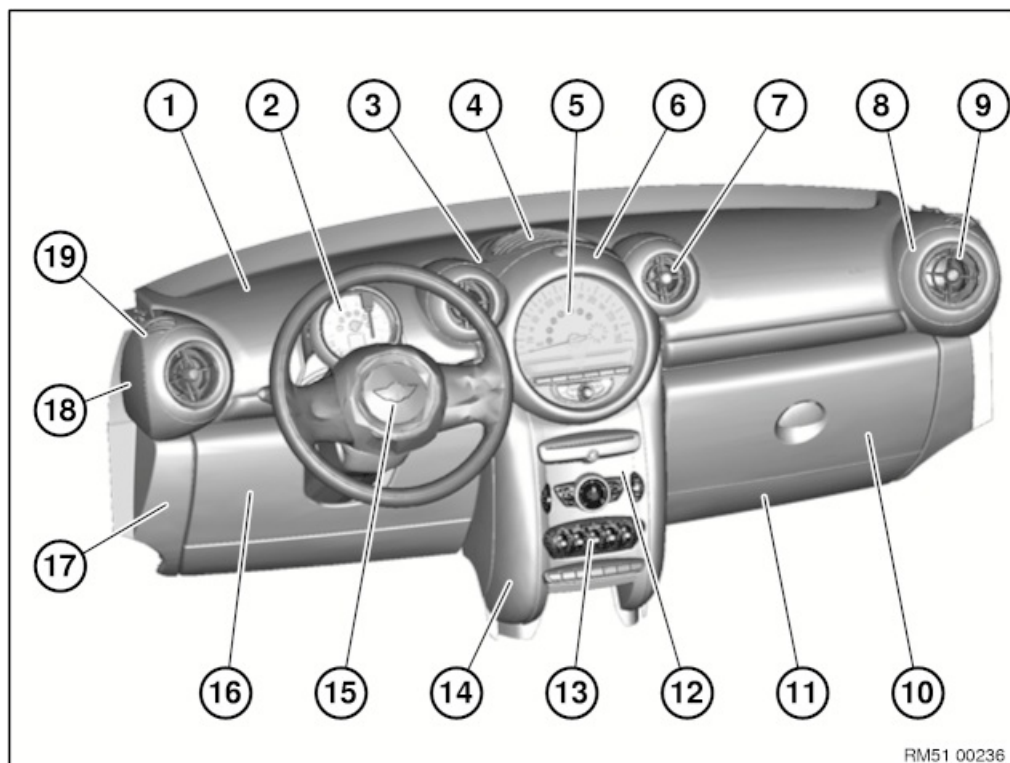


Operation is identical to:

Removing and installing/replacing front roofliner cover.



51 45 .. Overview of dashboard



- | | |
|--|--|
| 1 Dashboard trim panel | 11 Bottom right instrument panel trim |
| 2 Revolution counter | 12 Trim, centre console |
| 3 Instrument panel cover | 13 Centre console control panel |
| 4 Centre air duct cover (see centre console cover) | 14 Decorative trim for centre console (see centre console cover) |
| 5 Instrument panel control unit | 15 Sport / steering wheel |
| 6 Cover, instruments | 16 Bottom left instrument panel trim |
| 7 Fresh-air grille, middle | 17 Instrument panel side trim (see lid / cover for air vent) |
| 8 Cover, air vent, side | 18 Lid / cover, air vent, (side) |
| 9 Fresh air grille (side) | 19 Cover, air vent (side) |
| 10 Glove compartment | |



51 45 180 Remove and install instrument panel trim, bottom left \ PREMIUM

1 – Remove bottom left instrument panel trim

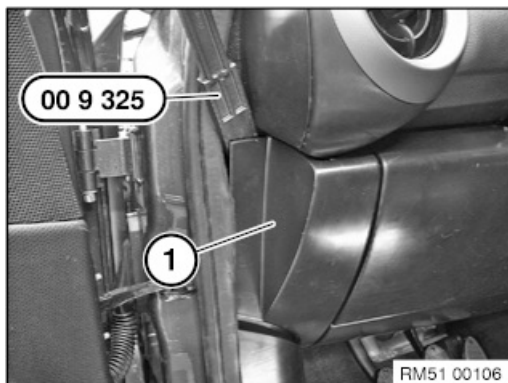


RISK OF DAMAGE

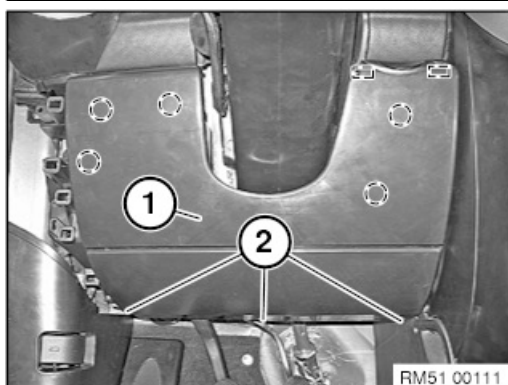
Scratches.

Tools and sharp-edged components can cause scratches.

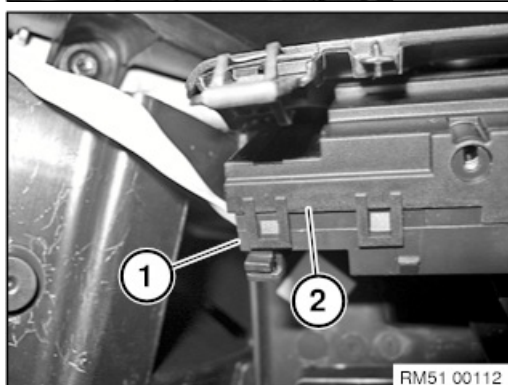
- Protect working area.
- Handle tools and components carefully.



- Unclip the instrument panel trim at the side (1) using the special tool [0 496 569 \(00 9 325\)](#) to the rear.



- Unscrew the screws (2) at the instrument panel trim on the bottom left (1).
- Lever out the clips in the highlighted areas or disengage the retaining clips.
- Carefully remove parts of the bottom left instrument panel trim (1).



- Unlock and disconnect the plug connection (1) at the insertion slot for the radio-operated key (2).
- Remove the instrument panel trim.

2 – Installing the bottom left instrument panel trim



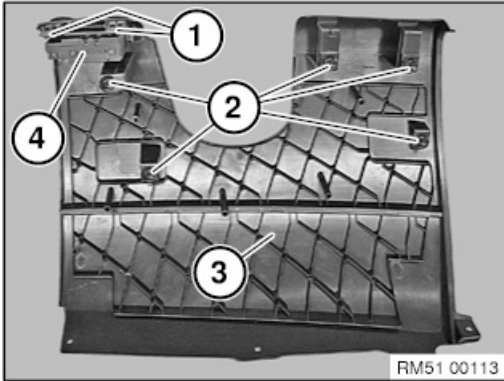


RISK OF DAMAGE

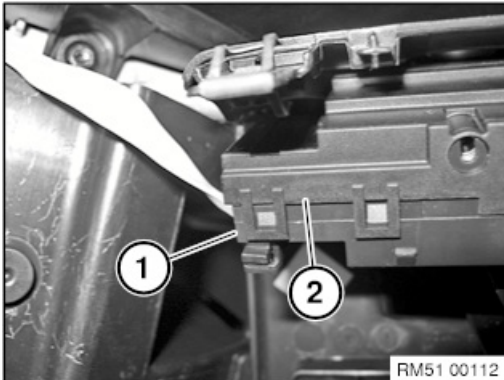
Scratches.

Tools and sharp-edged components can cause scratches.

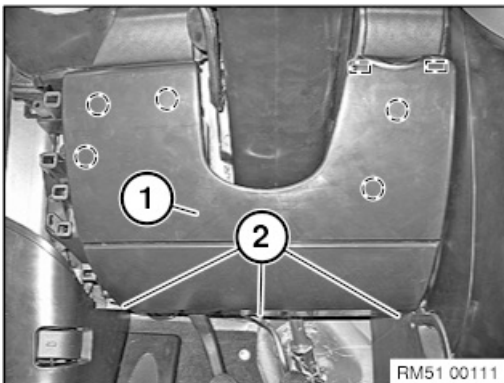
- Protect working area.
- Handle tools and components carefully.



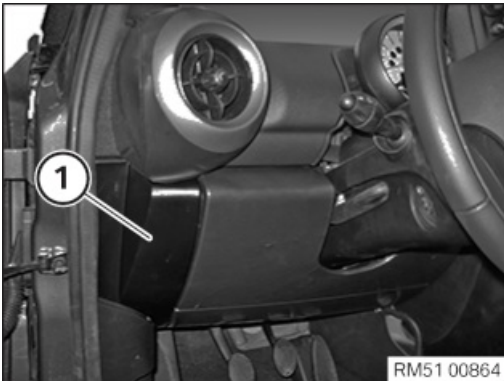
- Check the retaining clips (1) and the clips (2) of the bottom left instrument panel trim (3) for damage and renew if necessary.
- Make sure the insertion slot for the radio-operated key (4) is positioned correctly.



- Connect the plug connection (1) at the insertion slot for the radio-operated key (2).



- Insert the bottom left instrument panel trim (1).
- Clip in the instrument panel trim in the highlighted areas.
- Tighten the screws (2) at the instrument panel trim on the bottom left (1).



- Install the instrument panel trim at the side (1).

Additional Information

Overview of Special Tools



0 496 569 (00 9 325) Wedge



Common		Used in step 1
Usage	(Panel wedge) From 11/2008 this special tool replaces panel wedge 00 9 317 (different material)	
Included in the tool or work	0 490 527	
Storage location	Individual	
Replaced by		
In connection with		
SI-Number	41 01 09 (507)	



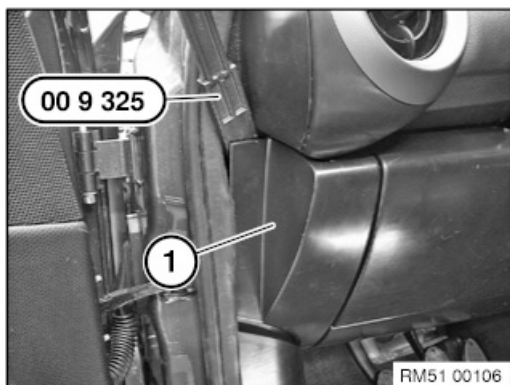


Special tools required:

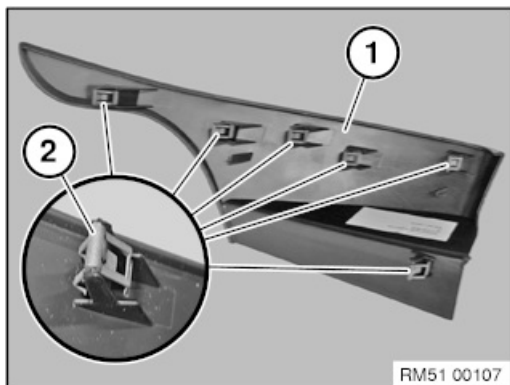
- 00 9 325



When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).

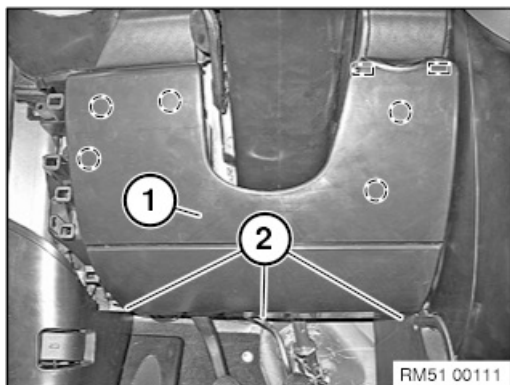


Use special tool 00 9 325 to unclip the side dashboard cover (1) towards the rear.



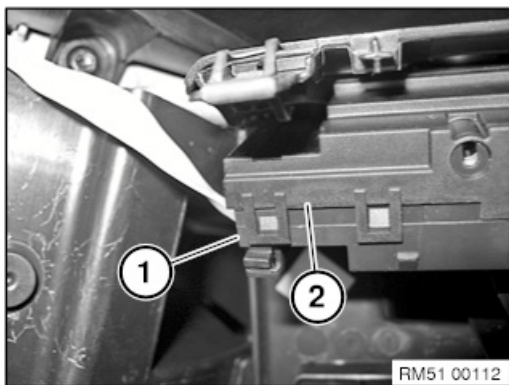
Installation note:

The clamps (2) on the side dashboard cover (1) must not be damaged or missing.

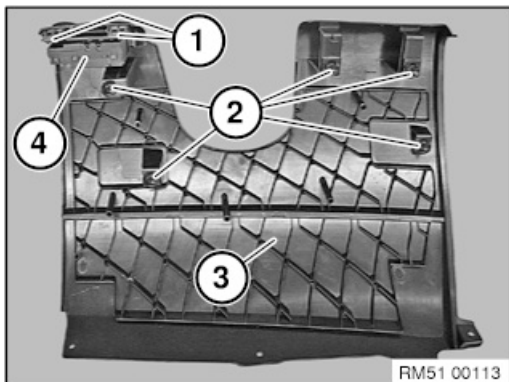


Release screws (2) on bottom left instrument panel trim (1).
Unclip fixing clips or unclamp retaining clips at marked locations.
Carefully feed out instrument panel trim at bottom left (1) slightly.





Unlock and disconnect plug connection (1) at insert for radio-operated key (2).



Installation note:

Retaining clips (1) and fixing clips (2) of instrument panel trim at bottom left (3) must not be damaged or missing.

Replacement

- Modify retaining clips (1) and fixing clips (2)
- Modify insert for radio-operated key (4)



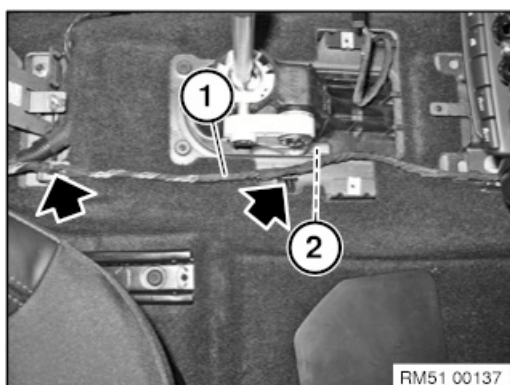


When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).

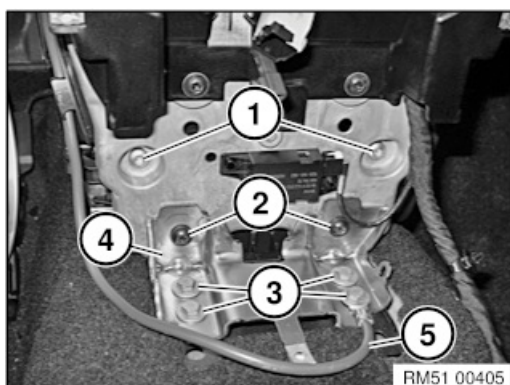


Necessary preliminary tasks:

- Move wheels into straight-ahead position
- Disconnect battery earth lead
- Remove door sill cover strip at front left and right
- Remove fresh-air grille on left and right
- Remove complete steering column
- Remove complete centre console
- Remove storage compartment
- Remove centre console cover



Unlock and disconnect all plug connections of wiring harness (1).
Unclip and roll up wiring harness (1) to mark (2).



Release screws (1).

Unfasten screws (2).

Tightening torque 51 45 8AZ.

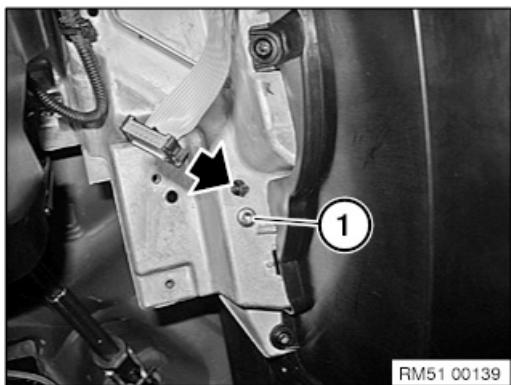
Undo bolts (3) and remove bracket (4).

Tightening torque 51 45 6AZ.

Installation note:

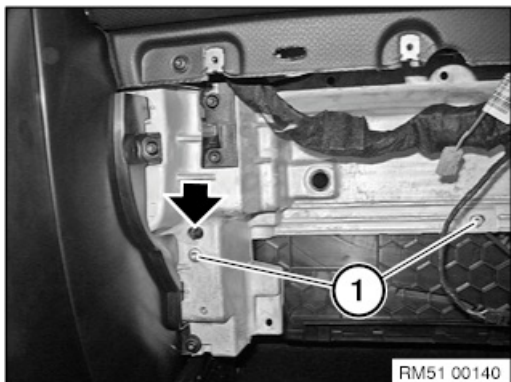
If necessary, observe the ground cable (5).





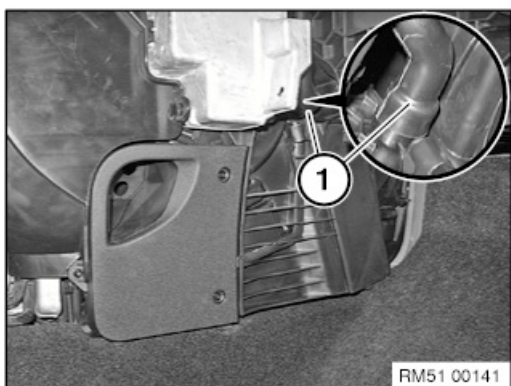
Release screw (1) on air conditioning housing on the left. *Installation note:*

Feed in guide pin of air conditioning housing correctly into recess on support for dashboard.

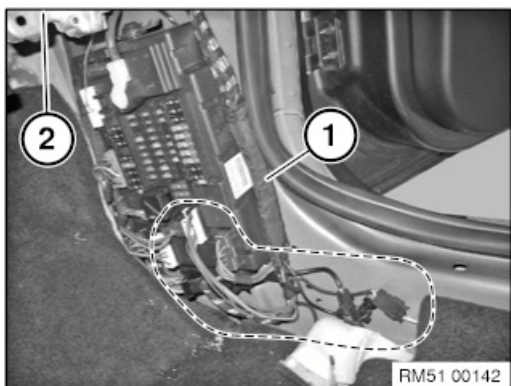


Release screws (1) on air conditioning housing on the right. *Installation note:*

Feed in guide pin of air conditioning housing correctly into recess on support for dashboard.



Disconnect the fresh-air duct (1) for the glove box on the air conditioning housing.

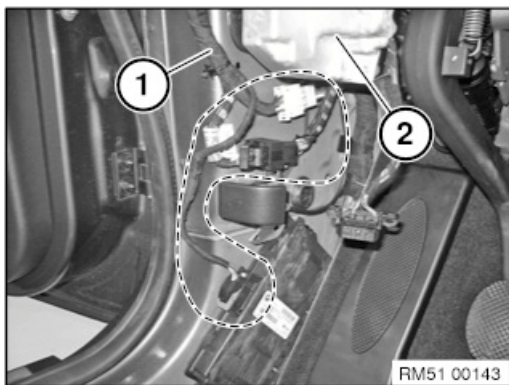


Right:

Unlock and disconnect all plug connections of wiring harness (1).

Unclip wiring harness (1) up to support for dashboard (2).

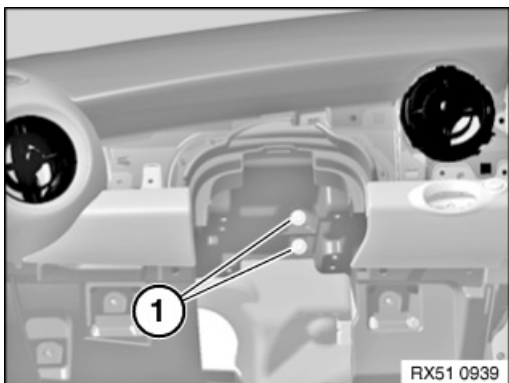




Left:

Unlock and disconnect all plug connections of wiring harness (1).

Unclip wiring harness (1) up to support for dashboard (2).

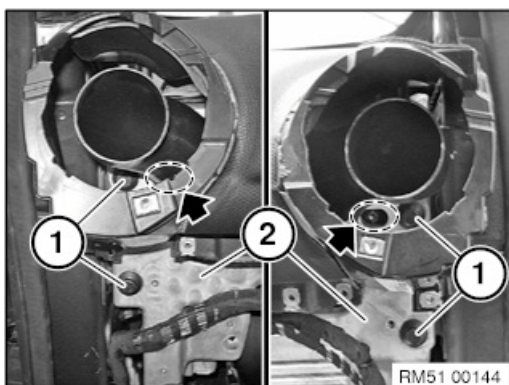


Note:

Graphic is similar.

Release screws (1) above steering column.

Tightening torque 51 45 7AZ.



Perform the next operations with the assistance of another person only:

Release screws (1) on left and right on support for dashboard (2).

Tightening torque 51 45 3AZ.

Carefully pull support for dashboard (2) together with the dashboard toward the back slightly.

Unlock and disconnect the necessary plug connections.

Carefully lift support for dashboard (2) together with the dashboard out of vehicle.

Installation note:

Mount support for dashboard (2) correctly on guide pin (mark).



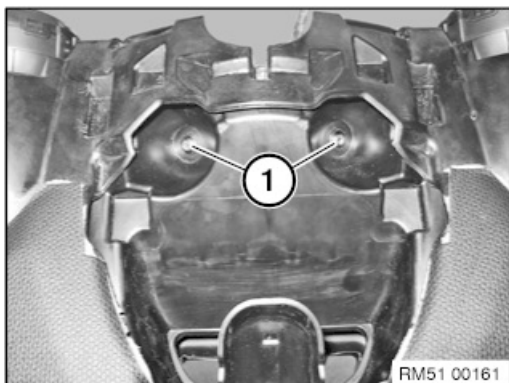


When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).

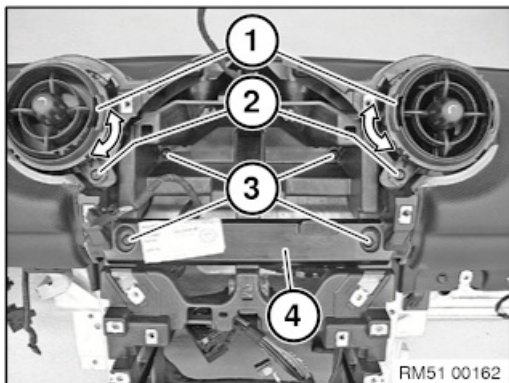


Necessary preliminary tasks:

- Remove dashboard complete with support
- Remove complete instrument panel

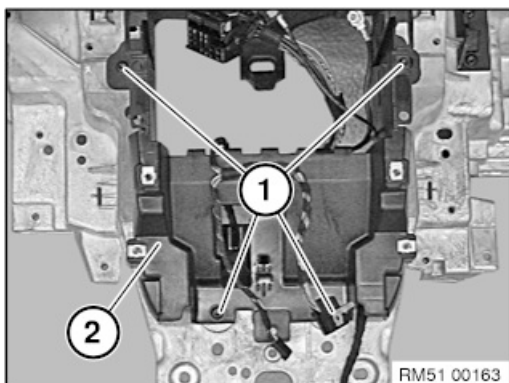


Release top screws (1).



Release screws (2) from middle of fresh air grille (1) at left and right.
Unlock and feed out middle of fresh air grille at left and right (1) by twisting.

Release screws (3) from function carrier (4).

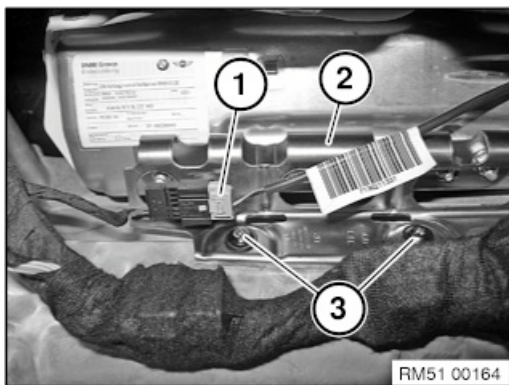


Release remaining screws (1) from function carrier (2).
Feed out the function carrier (2) and place to one side.

Installation note:

Make sure wiring harnesses are laid correctly.



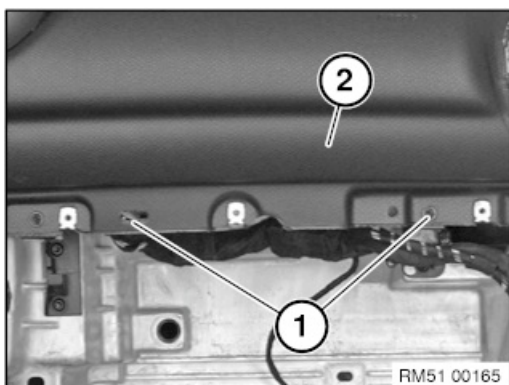


Release screws (3) on retaining bracket of front passenger airbag module (2).

Tightening torque 72 12 7AZ.

Unfasten plug connection (1) and disconnect.

Unclip counterpart of plug connection (1) from retaining bracket of front passenger airbag module (2).



Release screws (1) on trim panel of top part of dashboard (2) at right.

Feed out and remove trim panel of top part of dashboard (2) from dashboard support.



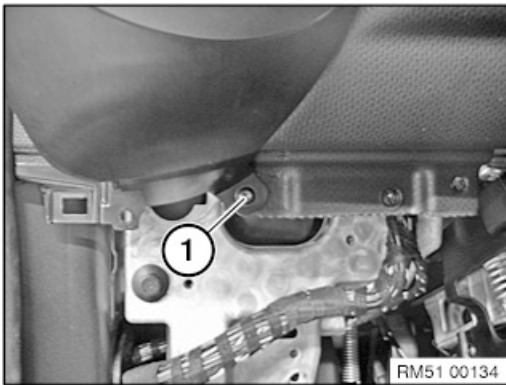


When working with trim panels, be sure that visible surfaces are not damaged or scratched (e. g. with sharp-edged tools).

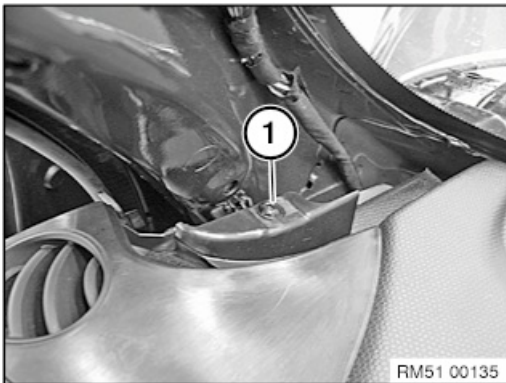


Necessary preliminary work:

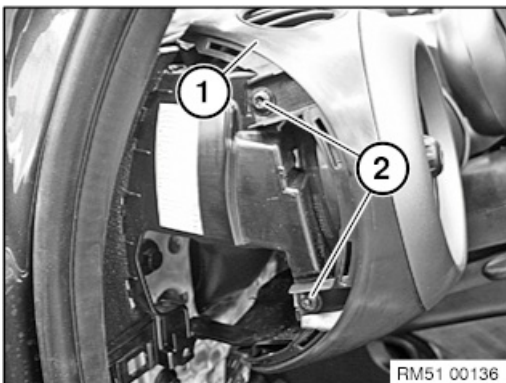
- Remove trim panel for front roof pillar (A-pillar) at left
- Remove trim for instrument panel at bottom left
- Remove lid of air outlet vent cover at left



Release bottom screw (1).



Release upper screw (1).



Release screws (2) on air outlet vent cover on left side (1).
Feed out air outlet vent cover on left side (1).





When working with trim panels, be sure that visible surfaces are not damaged or scratched (e. g. with sharp-edged tools).



Necessary preliminary work:

- Remove trim panel for front roof pillar (A-pillar) at right
- Remove right glove box with housing
- Remove side cover from cover for air outlet vent on right



All further work steps correspond to:

- Removing and installing/replacing air outlet vent cover on left side



72 12 006 Removing and installing/replacing airbag module for passenger knee protection



Special tools required:

- 00 9 325



Warning!

Read and comply with safety regulations for handling airbag modules and pyrotechnical belt tensioners.

Incorrect handling can activate airbag and cause injury.



Important!

Operations on pyrotechnical devices may only be carried out by authorised experts.

Improper, unauthorised operations may result in serious dangers.

Unauthorised persons are strictly prohibited from performing any operations on this system.

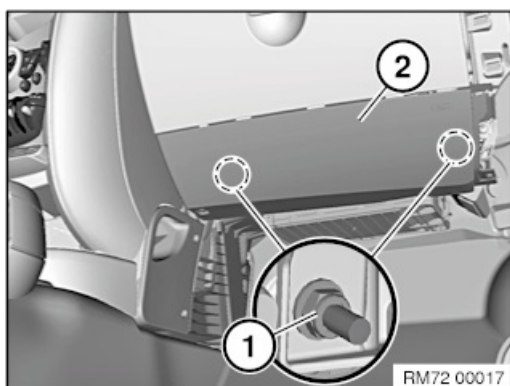


When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



Necessary preliminary tasks:

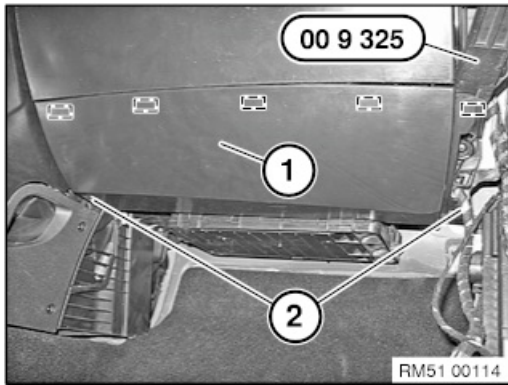
- Disconnect battery earth lead
- Remove front door sill cover strip



Release nuts (1) on rear side of trim panel (2).

Tightening torque 72 12 10AZ.

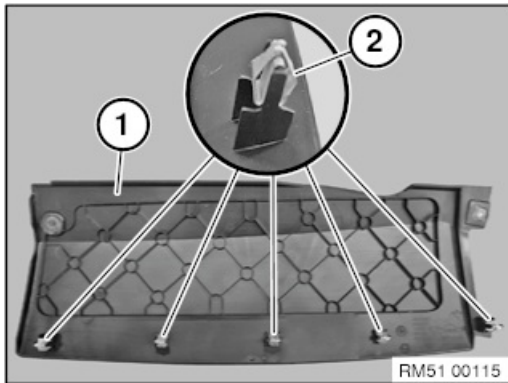




Release screws (2) on trim panel (1).

Using special tool 00 9 325 unclamp trim panel (2) in marked area from outside to inside.

Unlock and disconnect airbag plug connection behind.



Installation note:

Replace faulty retaining clips (2).

Replacement

Modify retaining clips (2) on trim panel (1).



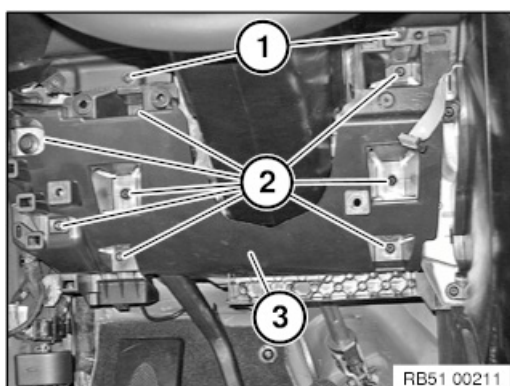


When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).

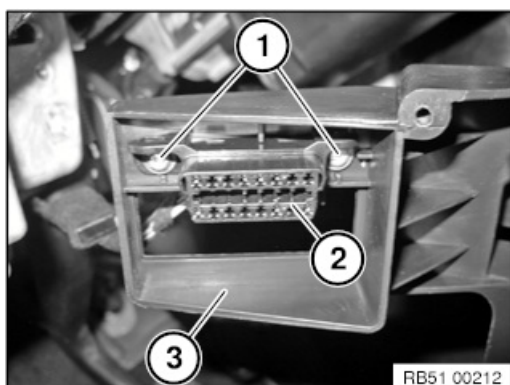


Necessary preliminary tasks:

- Remove dashboard trim at bottom left

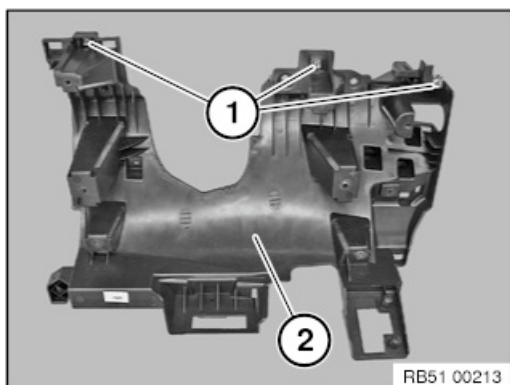


Undo screws (1) and (2) from support for dashboard trim panel (3).



Undo screws (1) from diagnostic socket carrier plate.

Feed diagnostic socket (2) out of support for dashboard trim panel (3).



Replacement

Fit speed nuts (1) on support for dashboard trim panel (2).



**Special tools required:**

- 00 9 325



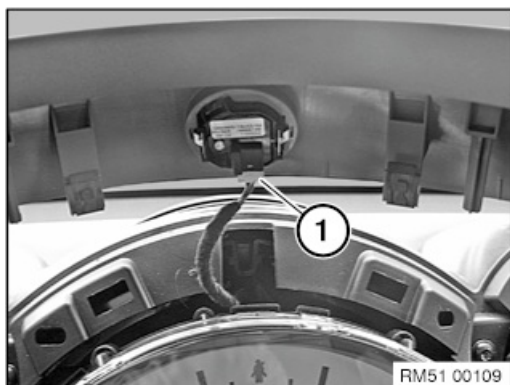
When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



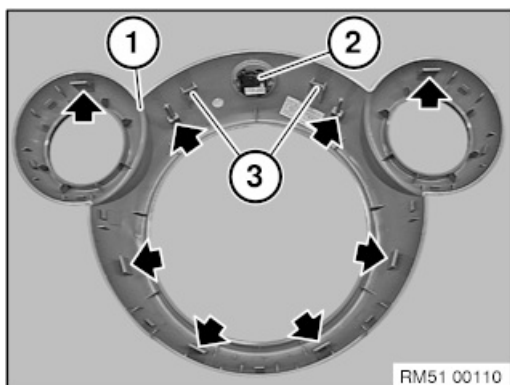
Carefully lever out instruments cover (1) with special tool 00 9 325

Installation note:

Ensure that the instrument cover (1) is correctly engaged in the marked area.



Disconnect plug connection (1).

**Installation note:**

Retaining clips (3), marked retaining pins and retaining tabs on instrument cover (1) must not be damaged or missing.

Replacement

Modify switch for hazard warning flashers (2).



51 45 181 Removing and installing/replacing for lower instrument panel trim (only US incl. knee airbag)



Special tools required:

- 00 9 325



Warning!

Read and comply with safety regulations for handling airbag modules and pyrotechnical belt tensioners.

Incorrect handling can activate airbag and cause injury.



Important!

Operations on pyrotechnical devices may only be carried out by authorised experts.

Improper, unauthorised operations may result in serious dangers.

Unauthorized persons are strictly prohibited from performing any operations on this system.

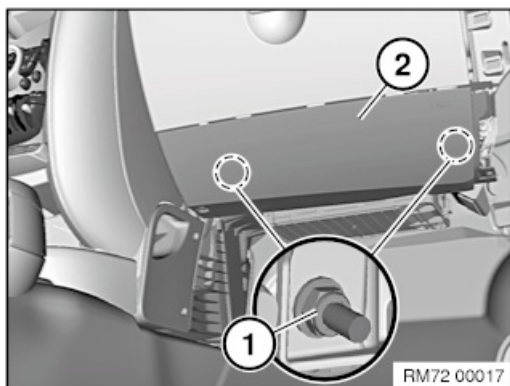


When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



Necessary preliminary tasks:

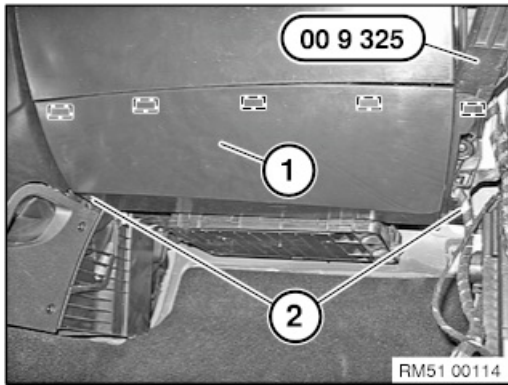
- Disconnect battery earth lead
- Remove front door sill cover strip



Release nuts (1) on rear side of trim panel (2).

Tightening torque 72 12 10AZ.

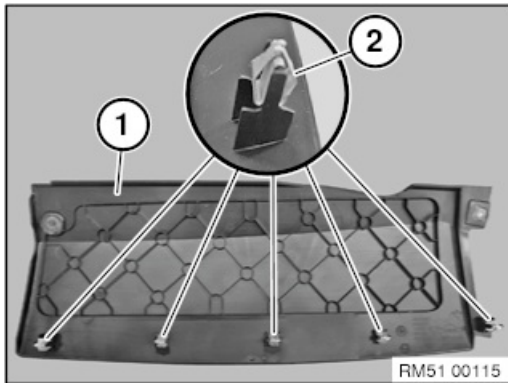




Release screws (2) on trim panel (1).

Using special tool 00 9 325 unclamp trim panel (2) in marked area from outside to inside.

Unlock and disconnect airbag plug connection behind.



Installation note:

Replace faulty retaining clips (2).

Replacement

Modify retaining clips (2) on trim panel (1).





Special tools required:

- 00 9 325

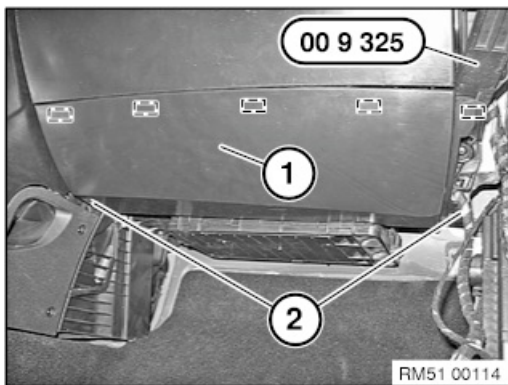


When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



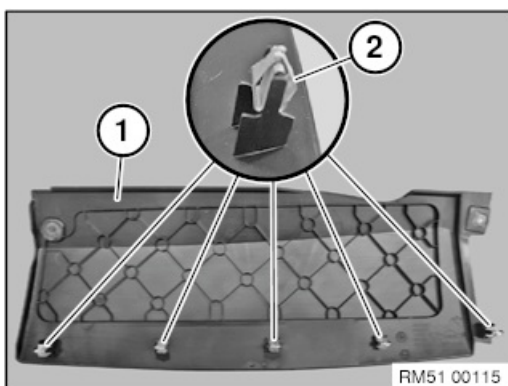
Necessary preliminary work:

- Remove front door sill cover strip



Release screws (2) on bottom right instrument panel trim (1).

Using special tool 00 9 325 , unclamp instrument panel trim at bottom right (1), at marked area, from outside to inside.



Installation note:

Retaining clips (2) must not be damaged or missing.

Replacement

Modify retaining clips (2) on bottom right instrument panel trim (1).



51 45 ... right

Removing and installing/replacing lid of air outlet vent cover, left or right

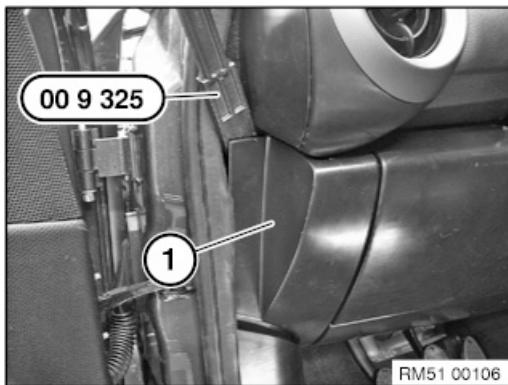


Special tools required:

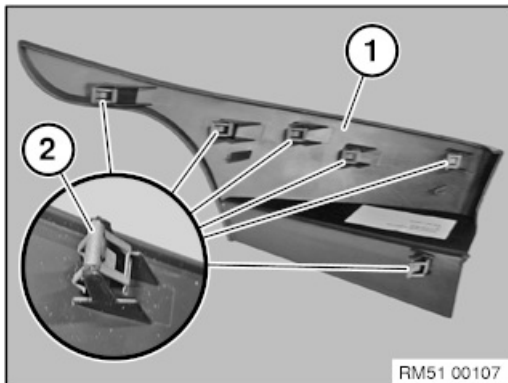
- 00 9 325



When working with trim panels, be sure that visible surfaces are not damaged or scratched (e. g. with sharp-edged tools).

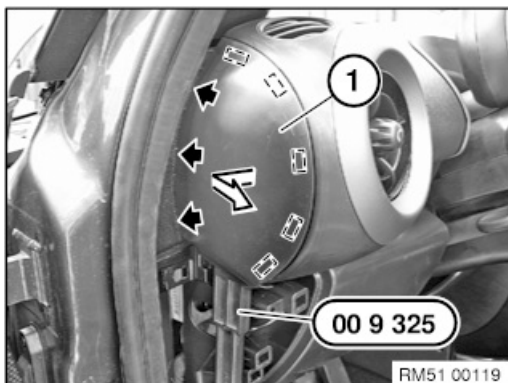


Use special tool 00 9 325 to unclip the side dashboard cover (1) towards the rear.



Installation note:

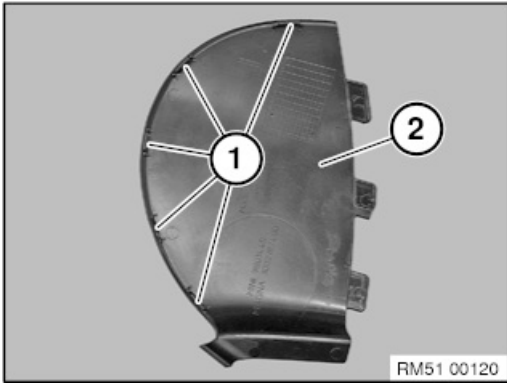
The clamps (2) on the side dashboard cover (1) must not be damaged or missing.



Unclamp lid of air outlet vent cover (1) from the bottom to the top as shown using special tool 00 9 325 .

Fold lid of the air outlet vent cover (1) out slightly and feed out toward the rear.





Installation note:

Plastic tabs (1) on lid of air outlet vent cover (2) must not be damaged or missing.



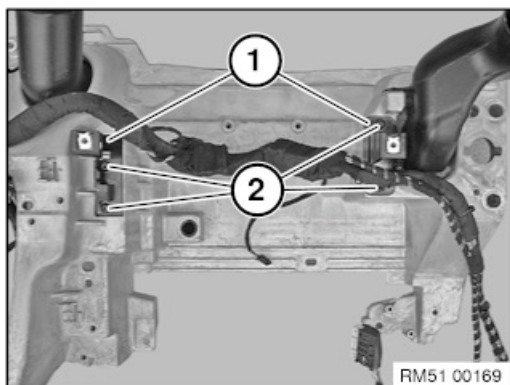


When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



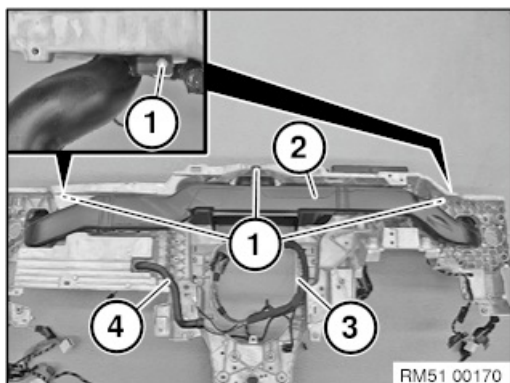
Necessary preliminary tasks:

- Remove dashboard top section trim



Release screws (2) from dashboard holder on passenger's side (1) on the inside and outside.

Set down both dashboard holders on passenger's side (1).

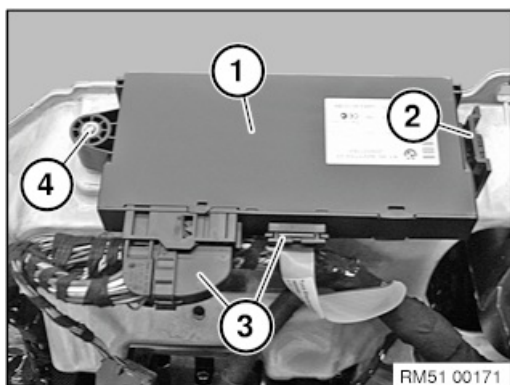


Release screws (1) of air duct (2).

Remove air duct (2) and place to one side.

Pull off cold air duct (4) for glove box.

Unclip wiring harness (3) completely.



Unlock and disconnect plug connections (3) on Car Access System (1).

Set down wiring harness.

Release screw (4) of Car Access System (1) and set down Car Access System (1).

Unclip retaining bracket (2) of Car Access System and set down.

Remove remaining small parts from support.



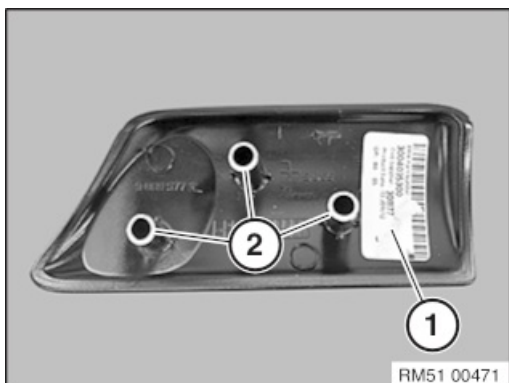


When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



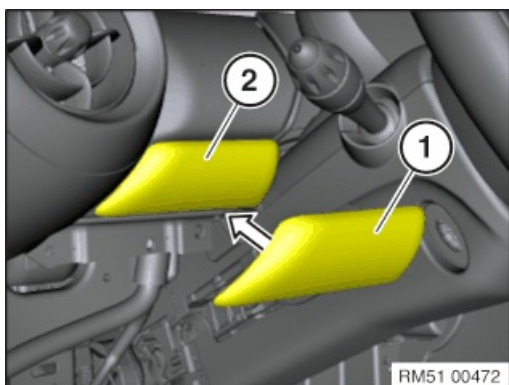
Necessary preliminary tasks:

- Remove support for instrument panel trim



Remove label (1).

Coat pins (2) of new decorative trim with white paint pen.



Place new decorative trim (1) with coated pins on decorative trim (2) thus marking positions of pins on decorative trim (2).

Drill out decorative trim (2) at marked positions with 13 mm dia. drill.

Mark drilling depth of max. 10 mm on drill, if necessary with adhesive tape.

Remove decorative strip (2).

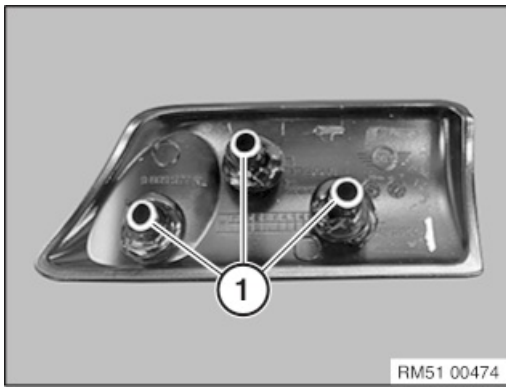


Remove pin remnants.

Remove loose welding remnants (1) from rear side of dashboard.

To guarantee decorative trim can be guided in better, drill holes if required.





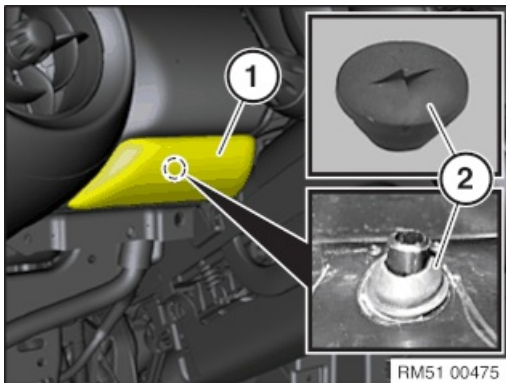
Clean bonding surface all around pins (1) with cleaning agent R2.

Prepare nozzle with dia. 8 mm.

Apply Sikaflex 221 all around pins (1).

Bond decorative trim to dashboard immediately after applying adhesive.

Remove emerging adhesive immediately.



Fix decorative trim (1) in position with rubber plug (2) to secure against sliding during the hardening time.

Cut slot in rubber plug (2) and place on centre pin providing counter support to decorative trim (1) from outer side.

After a hardening time of 2 hours it is no longer possible to move the decorative trim (1).

Resemble the vehicle after the hardening time.



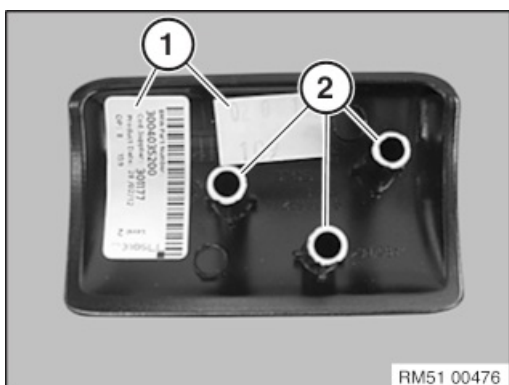


When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



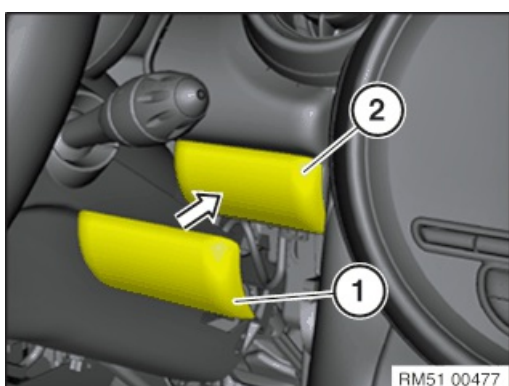
Necessary preliminary tasks:

- Remove support for instrument panel trim



Remove label (1).

Coat pins (2) of new decorative trim with white paint pen.



Place new decorative trim (1) with coated pins on decorative trim (2) thus marking positions of pins on decorative trim (2).

Drill out decorative trim (2) at marked positions with 13 mm dia. drill.

Mark drilling depth of max. 10 mm on drill, if necessary with adhesive tape.

Remove decorative strip (2).



Note:

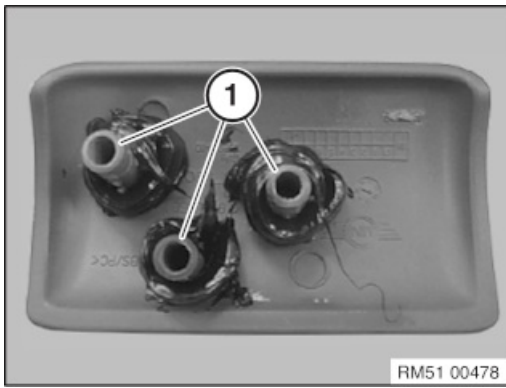
Similar to graphic.

Remove pin remnants.

Remove loose welding remnants (1) from rear side of dashboard.

To guarantee decorative trim can be guided in better, drill holes if required.





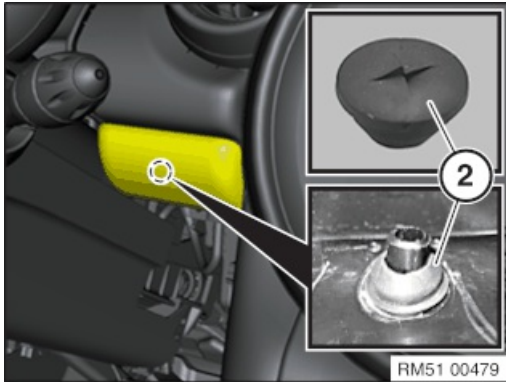
Clean bonding surface all around pins (1) with cleaning agent R2.

Prepare nozzle with dia. 8 mm.

Apply Sikaflex 221 all around pins (1).

Bond decorative trim to dashboard immediately after applying adhesive.

Remove emerging adhesive immediately.



Fix decorative trim (1) in position with rubber plug (2) to secure against sliding during the hardening time.

Cut slot in rubber plug (2) and place on centre pin providing counter support to decorative trim (1) from outer side.

After a hardening time of 2 hours it is no longer possible to move the decorative trim (1).

Resemble the vehicle after the hardening time.

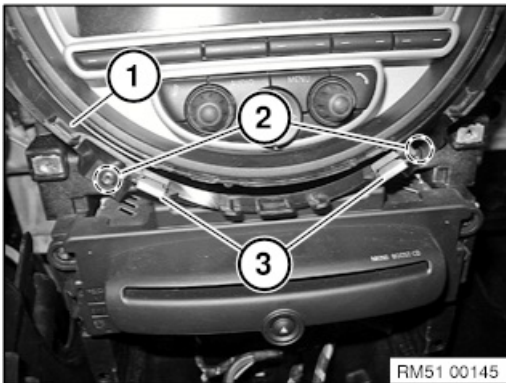




When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).

**Necessary preliminary work:**

- Remove centre console cover



Release remaining screws (2) from instrument panel cover (1).
Detach instrument panel cover (1) at top and feed out.

Replacement

- Modify all retainer clips (3).



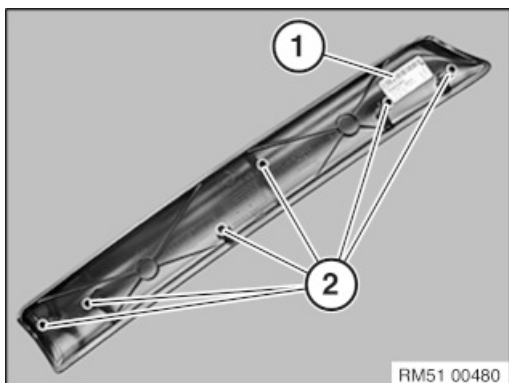


When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



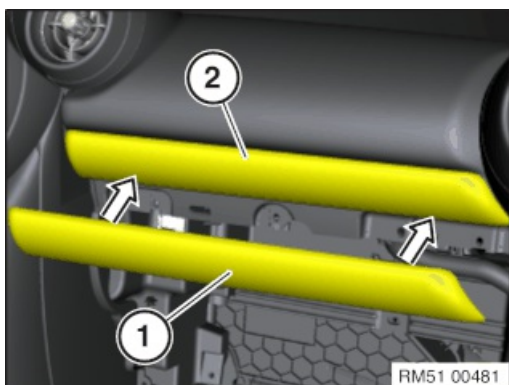
Necessary preliminary tasks:

- Remove glove box with housing



Remove label (1).

Coat pins (2) of new decorative trim with white paint pen.



Place new decorative trim (1) with coated pins on decorative trim (2) thus marking positions of pins on decorative trim (2).

Drill out decorative trim (2) at marked positions with 13 mm dia. drill.

Mark drilling depth of max. 10 mm on drill, if necessary with adhesive tape.

Remove decorative strip (2).



Note:

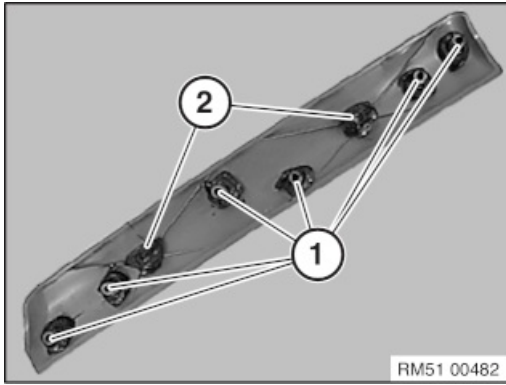
Similar to graphic.

Remove pin remnants.

Remove loose welding remnants (1) from rear side of dashboard.

To guarantee decorative trim can be guided in better, drill holes if required.





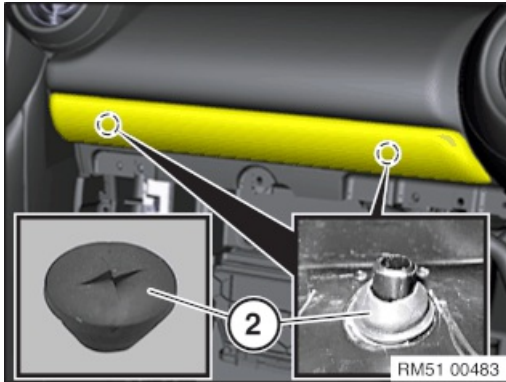
Clean bonding surface all around pins (2) and at intersection points (2) with cleaning agent R2.

Prepare nozzle with dia. 8 mm.

Apply Sikaflex 221 all around pins (1) and at intersection points (2) of reinforcing ribs.

Bond decorative trim to dashboard immediately after applying adhesive.

Remove emerging adhesive immediately.



Fix decorative trim (1) in position with rubber plug (2) to secure against sliding during the hardening time.

Cut slot in rubber plug (2) and place on centre pin providing counter support to decorative trim (1) from outer side.

After a hardening time of 2 hours it is no longer possible to move the decorative trim (1).

Resemble the vehicle after the hardening time.



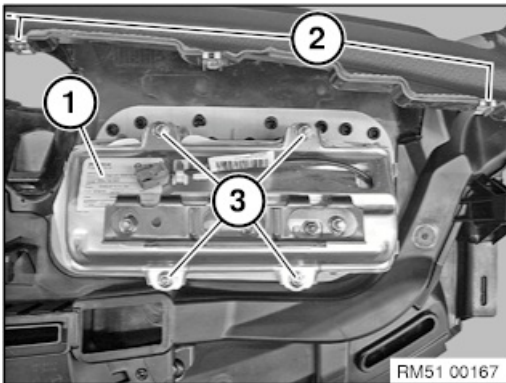


When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



Necessary preliminary tasks:

- Remove dashboard top section trim

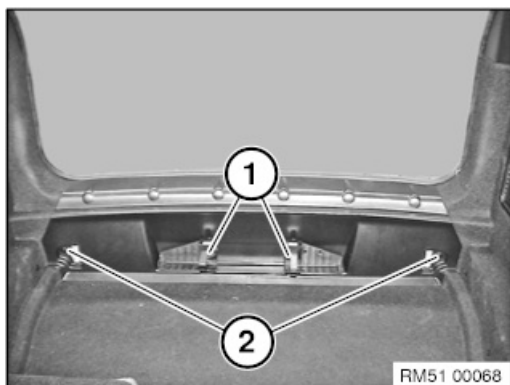


Release nuts (1) from front passenger airbag module.

Tightening torque 72 12 1AZ.

Modify sheet metal nuts (2).

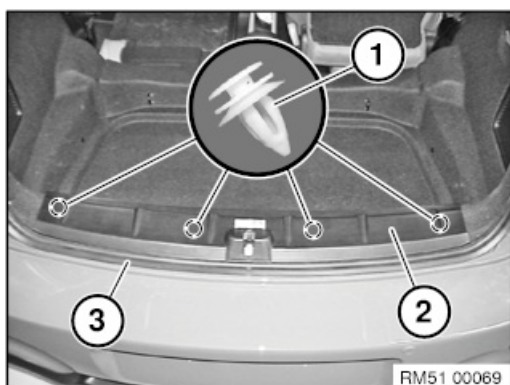




Remove warning triangle.

Release screws (1) and remove warning triangle holder.

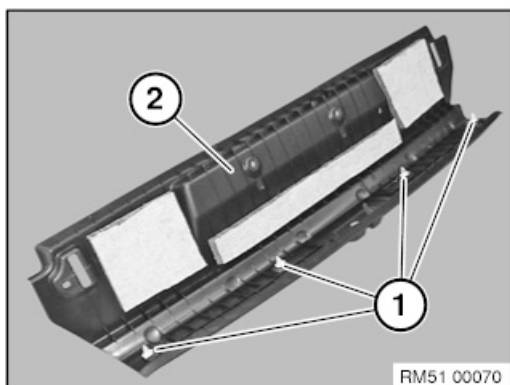
If necessary, release expanding rivets (2).



Release cover (2) from clips (1) and lift out.

Installation note:

Make sure edge protection (3) is correctly seated.



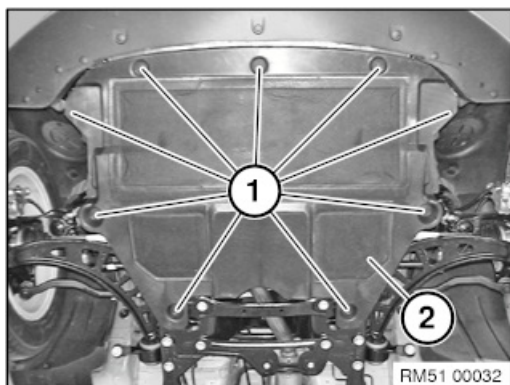
Installation note:

Replace faulty clips (1) on cover (2).



51 47 490
(petrol)

Removing and installing / replacing front underbody protection



Release screws (1).

Remove underbody protection (2).

Installation note:

Centre underbody protection and tighten down screws.



51 47 314 Removing and installing/replacing carpet for passenger compartment

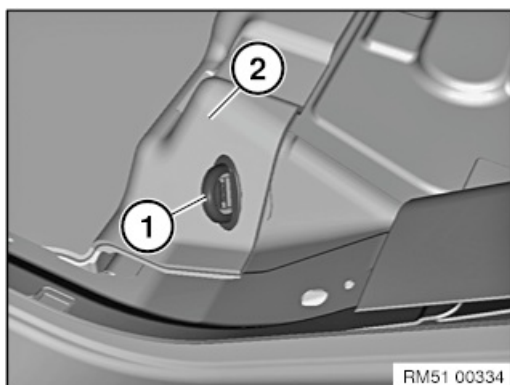


Necessary preliminary tasks:

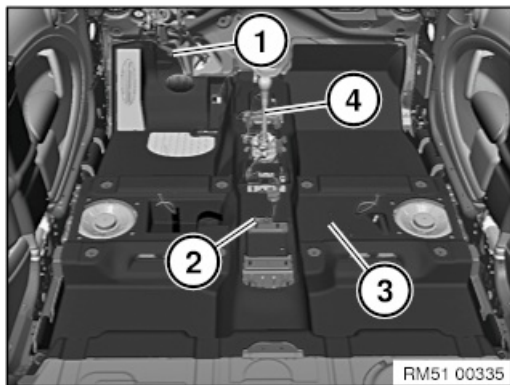
- Remove heater/air conditioner
- Remove both front seats
- Remove accelerator pedal module
- Remove parking brake lever
- Remove both door sill cover strip at the rear
- Remove both rear seats

Depending on version:

- Remove central bass speaker cover



Unclip protective cap (1) on the left and right.
Lever out carpet (2) using a hook.



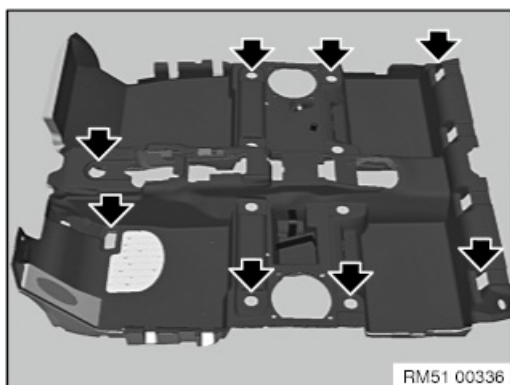
Release clip (1).

Undo nut (2) and remove ground cable.

Remove carpet (3) towards the top over the gearshift lever (4) and cable.

Installation note:

Ensure correct position of the cable.



Installation note:

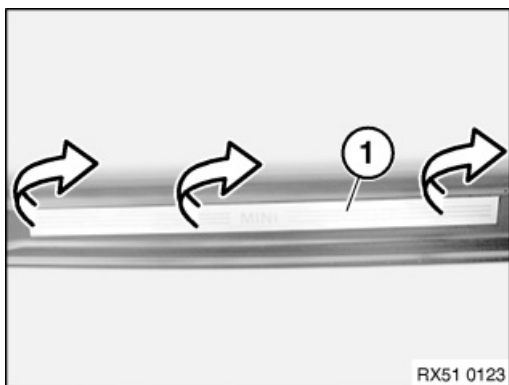
Apertures serve to position the carpet when inserting it.





Important!

The notes on component bonding with double-sided adhesive tape serve as the basis for these repair instructions and must be observed without fail.



Detach cover (1) and dispose of it. *Installation note:*

Clean bonding surface.

Stick on the new cover (1).

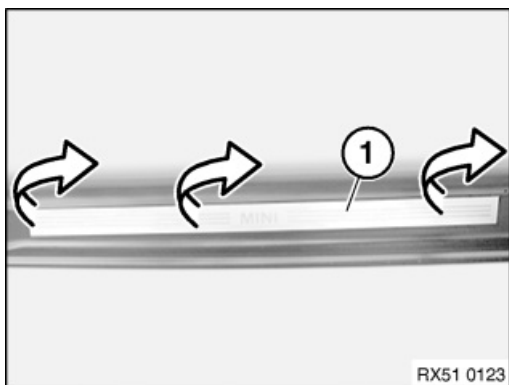


51 47 072 Removing and installing/replacing finishing strip at rear left or right entrance



Important!

The notes on component bonding with double-sided adhesive tape serve as the basis for these repair instructions and must be observed without fail.



Detach cover (1) and dispose of it. *Installation note:*

Clean bonding surface.

Stick on the new cover (1).

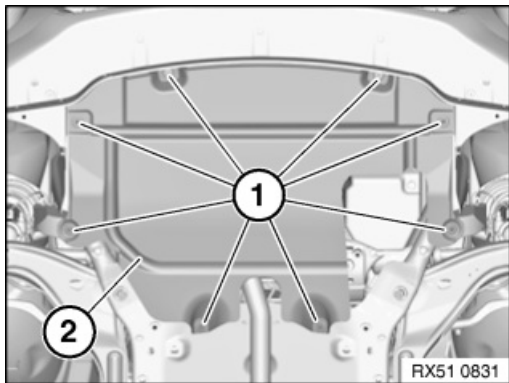


51 47 490 Removing and installing/replacing front assembly underbody protection (diesel)



Note:

Picture created using the R56 COOPER D as the example. There may be differences in detail in the case of other models.



Release screws (1).

Pull forward underbody protection (2) under bumper trim and remove.

Installation note:

Centre underbody protection and tighten down screws.



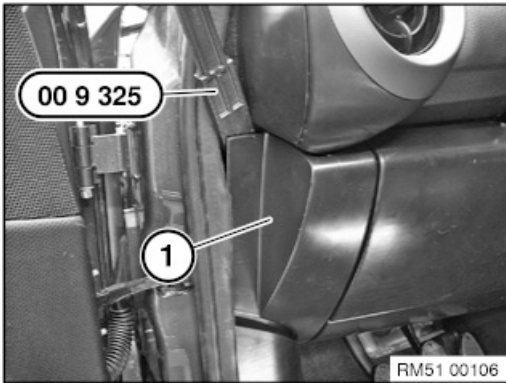
51 47 000 cover strip

Removing and installing/replacing front left or right door sill

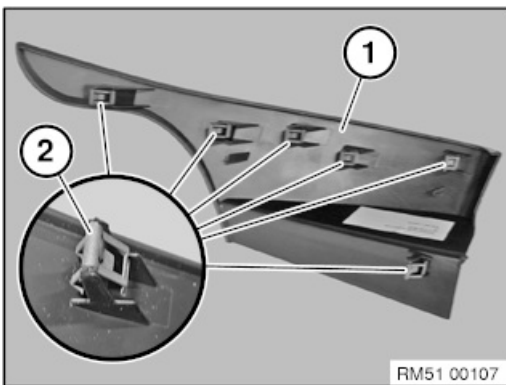


Special tools required:

- 00 9 325

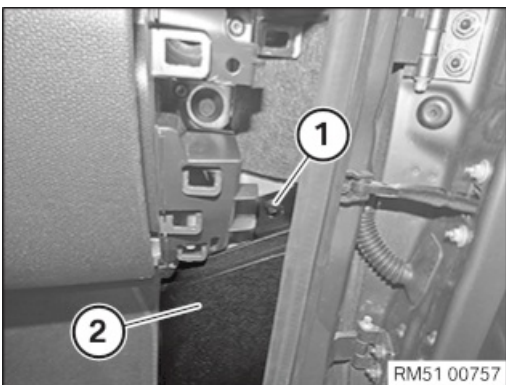


Use special tool 00 9 325 to unclip the side dashboard cover (1) towards the rear.



Installation note:

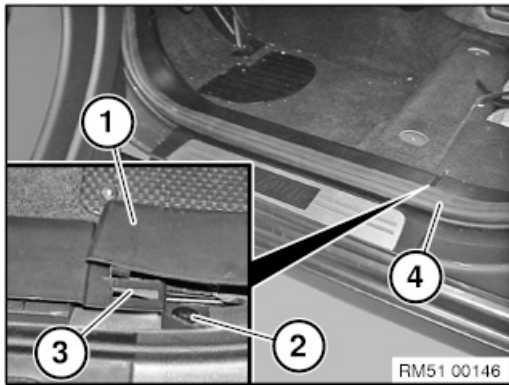
The clamps (2) on the side dashboard cover (1) must not be damaged or missing.



Front passenger side only:

Release the expanding rivet (1) from the right door sill cover strip (2).





Move front seat to the rear as far as it will go

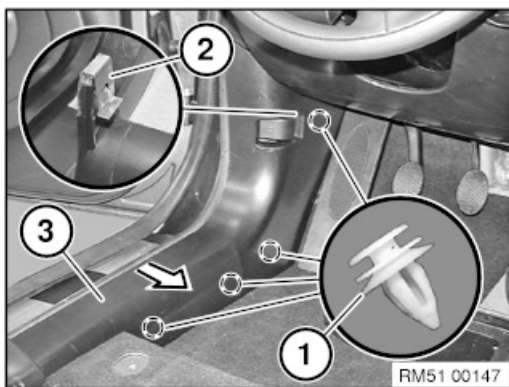
Detach edge protection (4) in area of door sill cover strip.

Lift out rear door sill cover strip (1) from guide (3) and release expanding rivet (2).

Installation note:

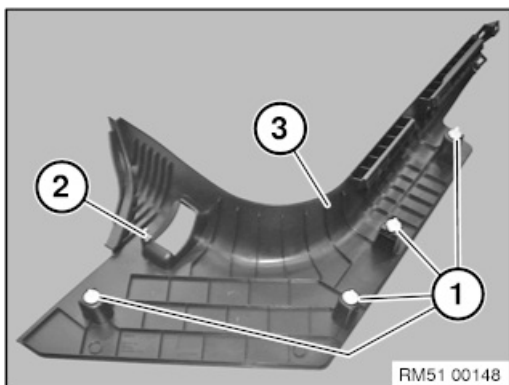
Ensure that edge protection (4) is correctly seated.

The rear door sill cover strip (1) must be flush in the guide (3).



Detach the door sill cover strip (3) from the clip (1) and clamp (2).

Remove door sill cover strip (3).



Installation note:

Replace the clip (1) and clamp (2) on the door sill cover strip (3).

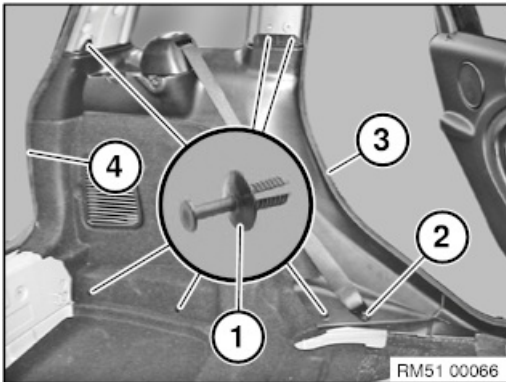


51 47 151 Removing and installing/replacing left luggage compartment wheel arch panel



Necessary preliminary work:

- Remove left rear seat
- Remove cover on rear apron
- Remove trim panel on rear roof pillar (C-pillar)
- Remove trim panel on rear roof pillar (D-pillar)
- Unlock emergency release of fuel filler flap



Release expanding rivet (1).

Release screw (2) from belt end fitting.

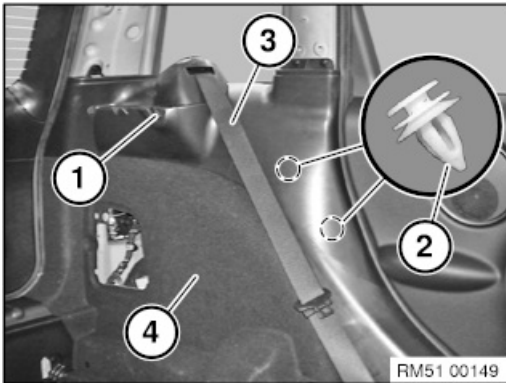
Tightening torque 72 11 7AZ

Loosen edge protection (3) and (4) in the area of the luggage compartment wheel arch panel.

Installation note:

Replace faulty expanding rivet.

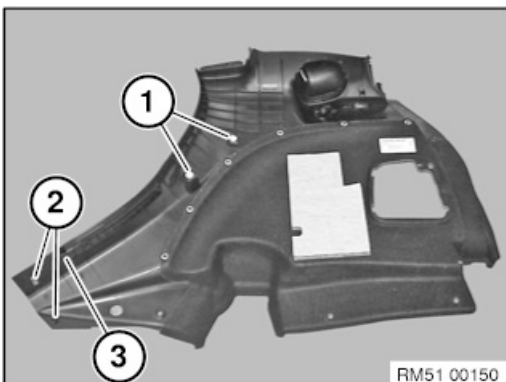
Make sure edge protection (3) and (4) is correctly seated.



Release screw (1).

Feed out seat belt strap (3) at top from wheel arch panel (4).

Detach wheel arch panel (4) from clips (2) and remove.

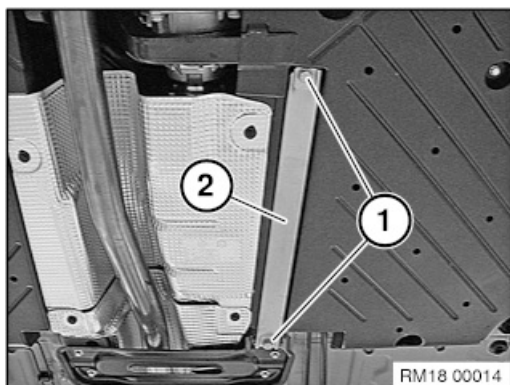


Replace faulty clips (1) and clamps (3).

The guides (2) must not be damaged.



51 75 001 Removing and installing/replacing left or right underbody cover

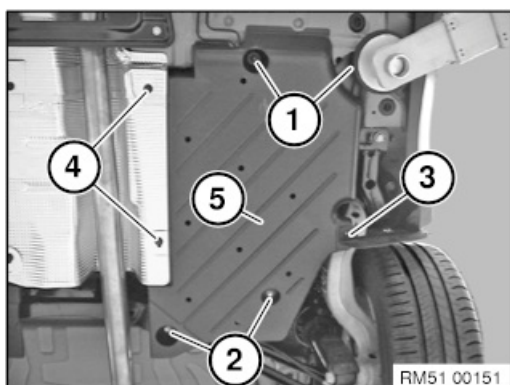


Right side only for vehicles with four-wheel drive:

Release screws (1).

Tightening torque 18 31 9AZ.

Remove stiffening strut(2).



Release plastic nuts (1).

Release screws (2 and 4).

Release expanding rivets (3) and remove the underbody panelling (5).

For right side operation, use mirror image of graphics.

Installation note:

Replace faulty retaining elements.

Make sure underbody panelling is correctly seated.

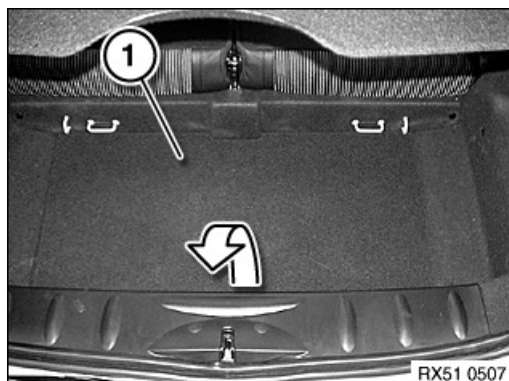


51 47 101 trim panel

Removing and installing/replacing luggage compartment floor



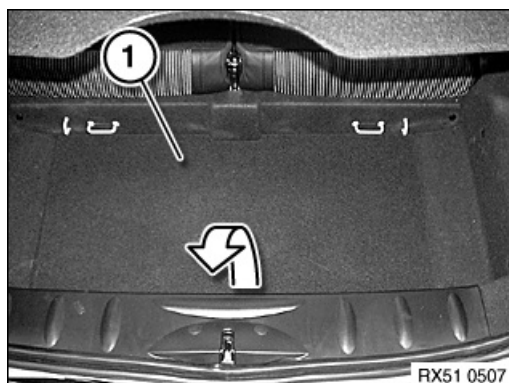
REMOVAL:



Remove luggage compartment floor trim panel (1) in direction of arrow.



INSTALLATION:



Insert luggage compartment floor trim panel (1) opposite to direction of arrow.

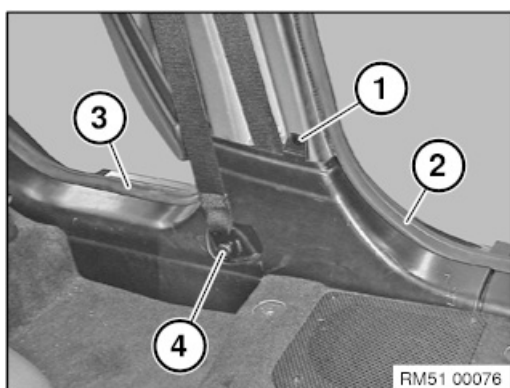


**Special tools required:**

- 00 9 325

**Necessary preliminary work:**

- Remove trim panel for door post



Move front seat forwards/up completely.

Release expanding rivet (1).

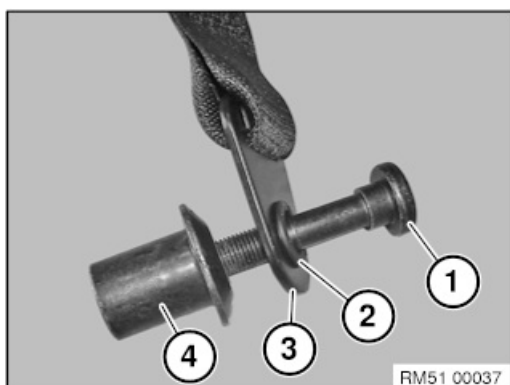
Detach edge protection (3) in area of the door sill cover strip (2).

Release screw (4).

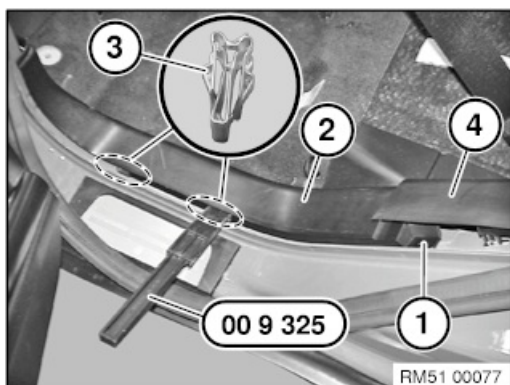
Tightening torque 72 11 4AZ.

Installation note:

Replace screw.



1. Screw
2. O-ring
3. Seat belt strap
4. Bush



Slightly raise the luggage compartment wheel arch panel (4).

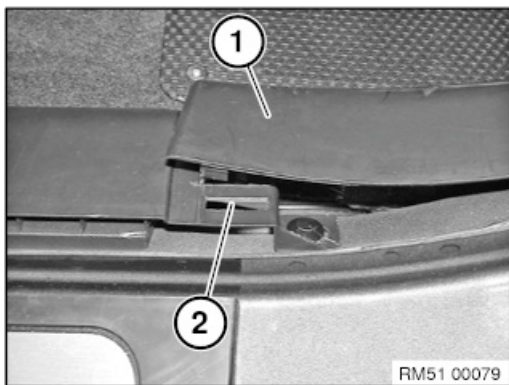
Release expanding rivet (1).

Carefully lever door sill cover strip (2) in the marked area from the clamps (3) with special tool 00 9 325 .

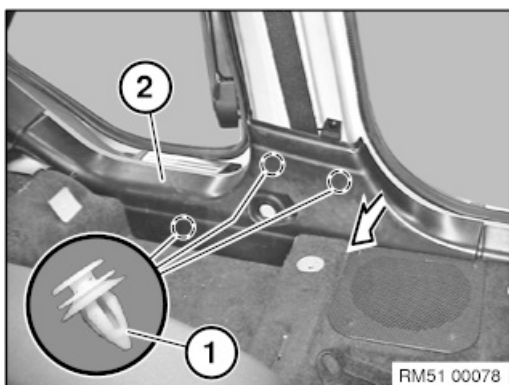
Installation note:

Replace clamps (3).





Lever door sill cover strip (1) out of guide (2).

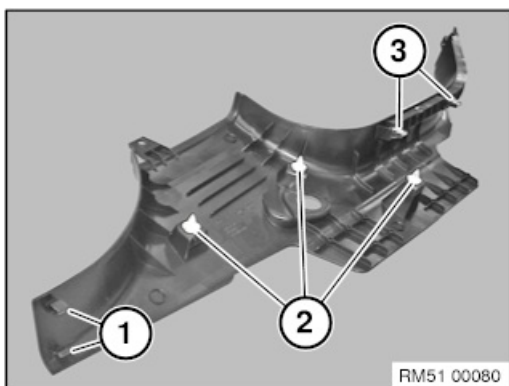


Important!

Seat shown removed for purposes of clarity.

Detach door sill cover strip (2) from clips (1).

Carefully lever out door sill cover strip (2).



Installation note:

Guides (1) must not be damaged.

Replace clips (2) and clamps (3).



51 47 161 Removing and installing/replacing right luggage compartment wheel arch panel



Except for work relating to luggage compartment light, operation is identical to:

Removing and installing/replacing left luggage compartment wheel arch panel.



51 48 ... Notes for bonding sound insulation (SI), doors



Special tools required:

- 51 0 300

Attention!

Do not yank at the sound insulation (risk of damage).

General:

Sound insulation is bonded to the inner door panel.

Bonded sound insulation must not be subjected to load (e.g. leak test) before 5 hours have elapsed.

On-the-job safety:

When working with bonding products (adhesive, cleaning agent, etc.):

- Wear safety goggles, protective gloves and if necessary an apron.
- Ensure the area is well ventilated.
- Change work clothing contaminated with adhesive immediately.
- Change work clothing contaminated with solvents and swelling agents immediately (keep spare work clothing on hand).
- Take skin protection measures, provide washing facilities including hot water, use silicone-free skin creams.
- Always keep an eye douche on hand, change the water regularly (once a month).
- Comply with the relevant safety regulations.

Handling adhesive area on inner door panel:

Adhesive	Cleaning
a. Butyl bead applied to sound insulation with protective film	a. Cleaning agent R2 <i>Under no circumstances: paint thinning</i>
b. Butyl mini-round profile \varnothing 4 mm from the roller	b. Carry out bonding only after an air drying time \geq 1 min. Air drying time may be omitted if the entire bonding surface is wiped with a dry cloth
c. Butyl round profile \varnothing 6 mm from the roller	c. After cleaning, the bonding surface may not be touched with hands or fouled again

Repair in area of sound insulation, door:

Repair	<ul style="list-style-type: none">• Cut the butyl rope between the sound insulation and the inner door panel with a sharp knife• After the repair is finished, position a new butyl rope \varnothing 4 mm directly on the original adhesive bead• Heat the butyl bead with a standard hot air blower until the butyl rope strings when touched slightly. Do not damage the sound insulation in the process• Press on with special tool 51 0 300. Perform this work extremely carefully because the increased amount of adhesive requires contact pressure of \geq 20 N/cm² (compared to firm thumb pressure \sim 30 N/cm²)• Visually check the adhesive bead and its compression (no capillaries or broken adhesive bead permitted)
--------	--



in the event of
damaged sound
insulation or
leakage

- In the cases mentioned, the complete sound insulation must be replaced. After removing the sound insulation, removal all butyl remnants from the inner door panel. Apply 6 mm \varnothing butyl rope to new sound insulation
- Press on with special tool 51 0 300. Contact pressure $\geq 20 \text{ N/cm}^2$ (compare to firm thumb pressure $\sim 30 \text{ N/cm}^2$)

The sound insulation must be bonded watertight below the door lock:

- Flat bonding surface required all round.
- No bonding in the event of moisture (e.g. condensation, etc.).
- Bonding area must not show any traces of adhesion-reducing residues (e.g. separating agents, greases, oils, paraffins, plastisols, cavity wax, polishing dust residues, etc.).
- Remove the protective film directly before joining (under no circumstances remove earlier, since the butyl, because of its stickiness, will very quickly pick up adhesion-reducing dirt contaminants).
- The sound insulation must be attached with positional accuracy to the inner door panel because it will no longer be possible to change the position without damaging the butyl bead.
- With repainted areas, the maximum permitted temperature of 90°C may not be exceeded in the area of the sound insulation. Otherwise, the sound insulation must be removed (and replaced, if necessary).

Expiry date of adhesive:

24 months, see label on packaging.

Disposal of the cleaning cloth:

Cleaning cloths and cleaning agent residues are hazardous waste (see also safety data sheet).

Disposal of adhesive:

Hazardous waste (see also safety data sheet).

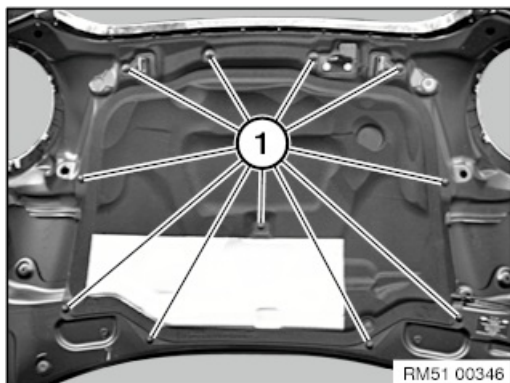


51 48 001 Removing and installing/replacing insulation lining on engine hood/bonnet



Note:

Work shown on R58 COOPER SD by way of example, deviations in detail are possible in other models.



Remove threaded blind rivet (1) from the noise insulation.

Remove noise insulation.

Installation note:

If necessary, replace faulty threaded blind rivet (1).



51 48 060 Removing and installing/replacing sound insulation in left or right front door

PRELIMINARY WORK

1 – Removing the handle recess in the front door trim panel

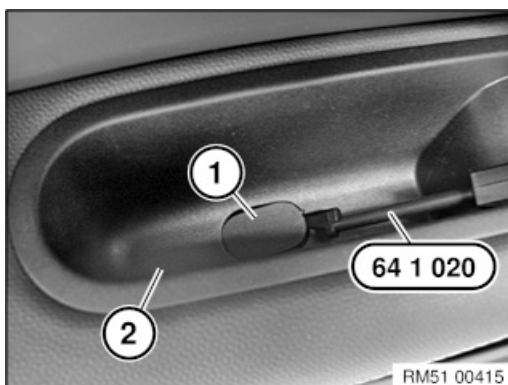


RISK OF DAMAGE

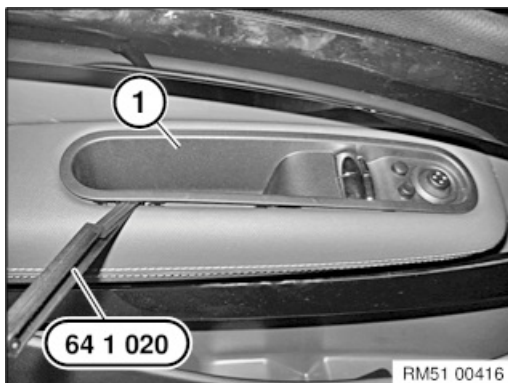
Scratches.

Tools and sharp-edged components can cause scratches.

- Protect working area.
- Handle tools and components carefully.



- Unclip the cover (1) using special tool [0 496 569 \(00 9 325\)](#) from the handle recess (2).
- Release screw underneath.



- Start at the rear and unclip the handle recess (1) using special tool [0 496 569 \(00 9 325\)](#).
- Disconnect the associated plug connection and remove the handle recess (2).

2 – Removing the front door trim panel on the left or right (from 11/2012)



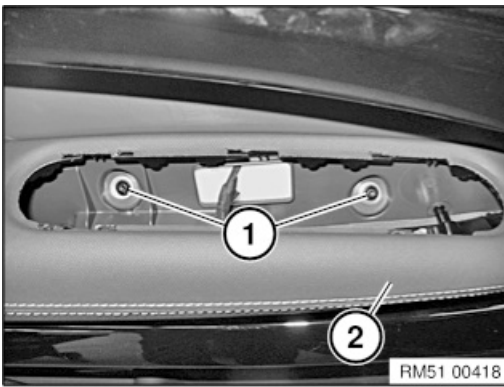
RISK OF DAMAGE

Scratches.

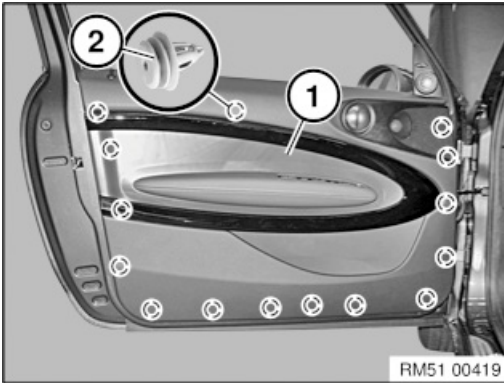
Tools and sharp-edged components can cause scratches.

- Protect working area.
- Handle tools and components carefully.

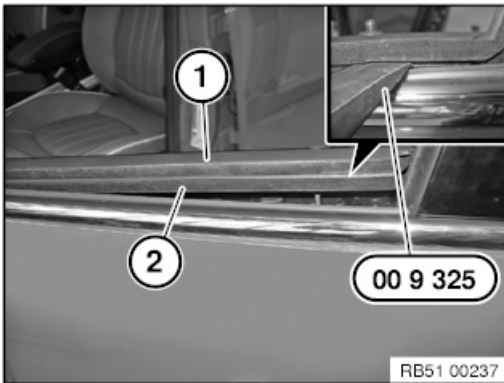




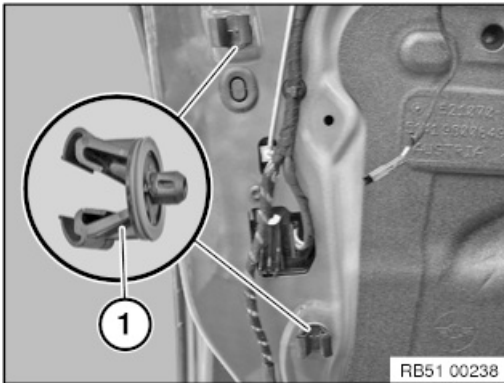
- Release screw (1) from the door trim panel (2).



- Release the door trim panel (1) with the special tool [0 496 569 \(00 9 325\)](#) from the clips (2).



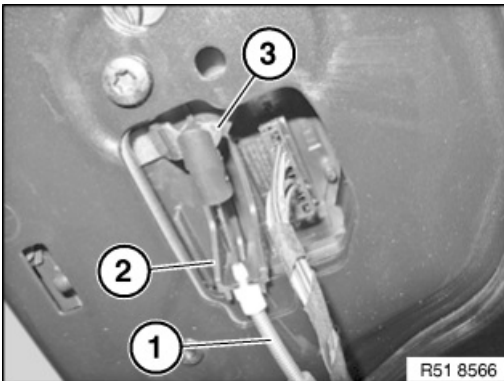
- Completely open the window glass.
- Lever out the [0 496 569 \(00 9 325\)](#) door trim panel (1) including the weather strip (2) upward from outside with the special tool.



NOTICE

For a better overview the removed condition is shown here.

- Lever up the door trim panel till the door trim panel is released from the upper and lower clips (1).



- Detach the Bowden cable (1) of the inside door handle on the counter support (2).
- Detach the Bowden cable (1) of the inside door handle at the door lock (3).
- Unlock all plug connections and disconnect.
- Uncouple the vehicle wiring harness at the door trim panel.
- Remove door trim panel.

3 – Removing the front door trim panel on the left or right (up to 11/2012)



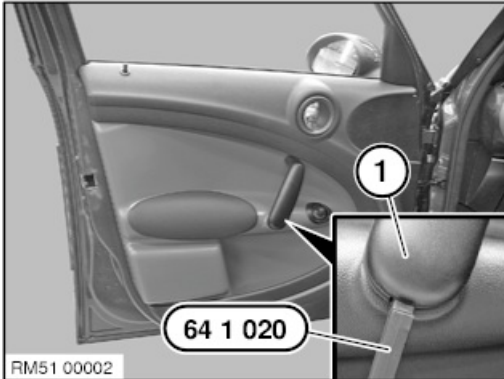


RISK OF DAMAGE

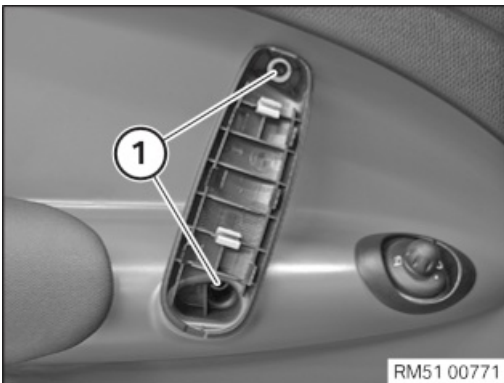
Scratches.

Tools and sharp-edged components can cause scratches.

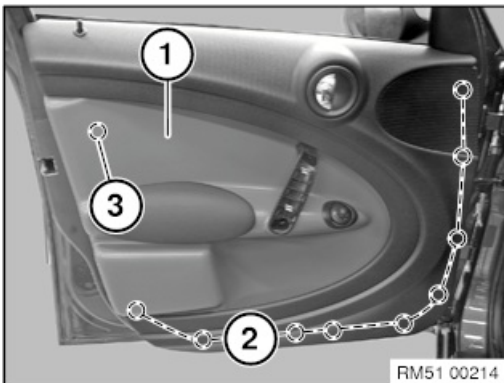
- Protect working area.
- Handle tools and components carefully.



- Lever off and remove cover (1) on the door handle with the special tool [0 493 681 \(64 1 020\)](#).

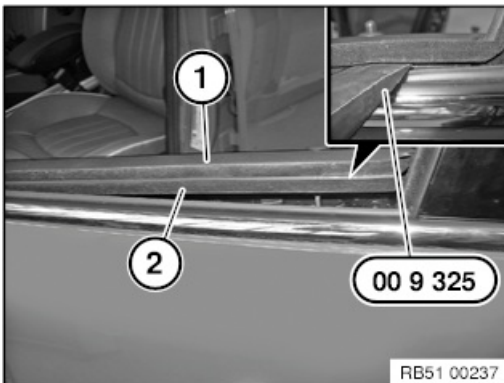


- Loosen screws (1).



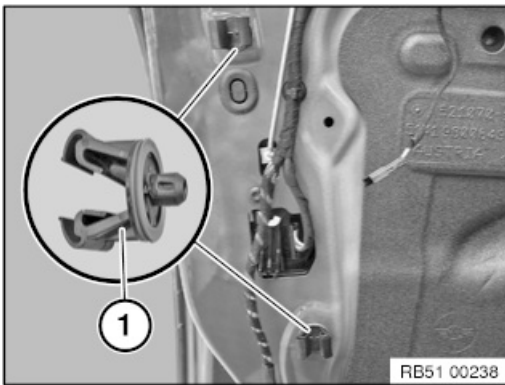
- Unclip the door trim panel (1) at the marked positions (2) with the special tool [0 496 569 \(00 9 325\)](#).

The clip (3) is unclipped from the door trim panel and remains on the inner door panel.



- Completely open the window glass.
- Lever out the [0 496 569 \(00 9 325\)](#) door trim panel (1) including the weather strip (2) upward from outside with the special tool.

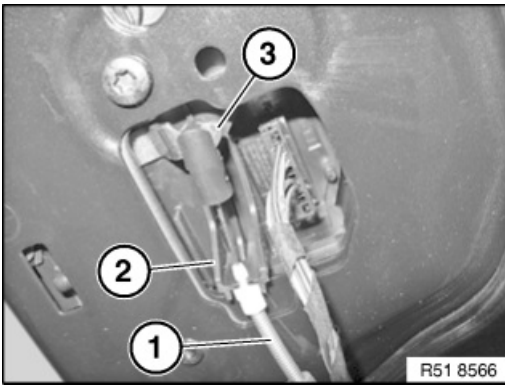




NOTICE

For a better overview the removed condition is shown here.

- Lever up the door trim panel till the door trim panel is released from the upper and lower clip (1).
- Detach the Bowden cable (1) of the inside door handle at the counter support (2).
- Detach the Bowden cable (1) of the inside door handle at the door lock (3).
- Unlock all plug connections and disconnect.
- Unclip the vehicle wiring harness at the door trim panel.
- Remove door trim panel.



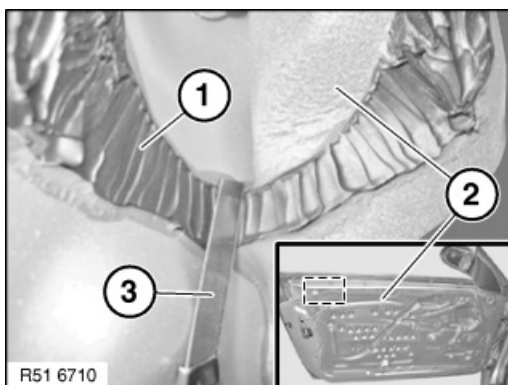
4 – Removing sound insulation on front door



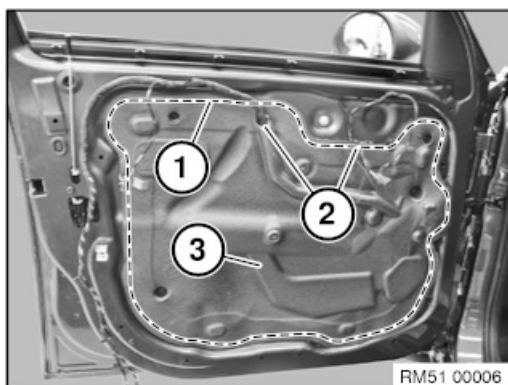
TECHNICAL INFORMATION

Notes on the sound insulation must be strictly observed for these repair instructions.

For more information see: 51 48 ... Notes on bonding the sound insulation (SI) in doors

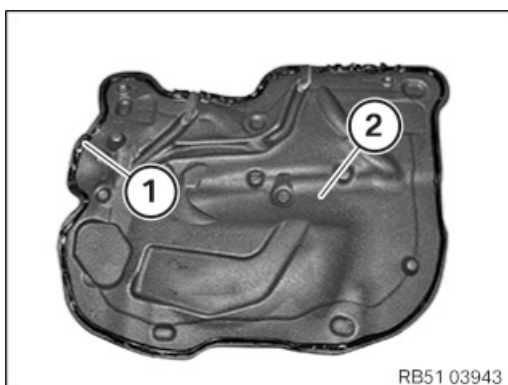


- When cutting through the sealing bead (1) make sure not to damage the sound insulation (2) and any potentially routed cables.
- Use a suitable, sharp cutting tool (3) to cut through the sealing bead (1) of the sound insulation (2) in the corresponding area.



- Completely cut through the sealing bead (1).
- Remove the sound insulation (3) at the cables (2).

5 – Reinstalling the sound insulation



- Attach the new butyl rope (1) (Ø 4 mm) to the existing butyl rope on the sound insulation (2).
- Heat the butyl rope (1) with a hot air blower.
- Press the sound insulation (2) against the door.

POSTPROCESSES

6 – Installing the front door trim panel on the left or right (from 11/2012)



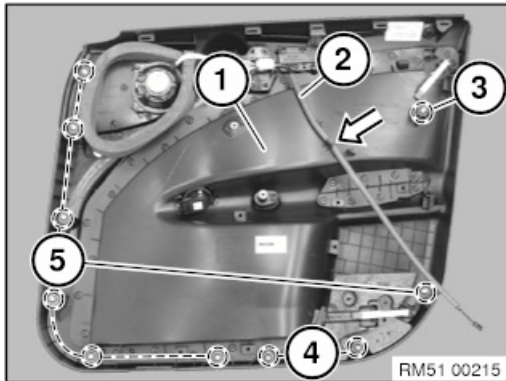


RISK OF DAMAGE

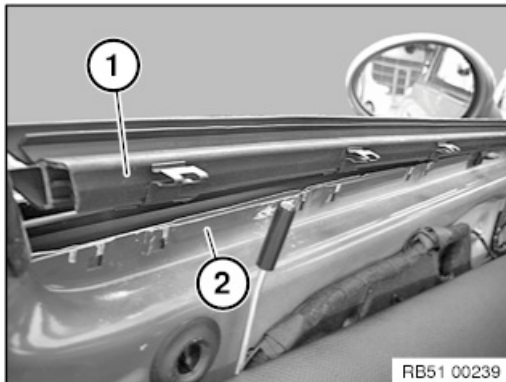
Scratches.

Tools and sharp-edged components can cause scratches.

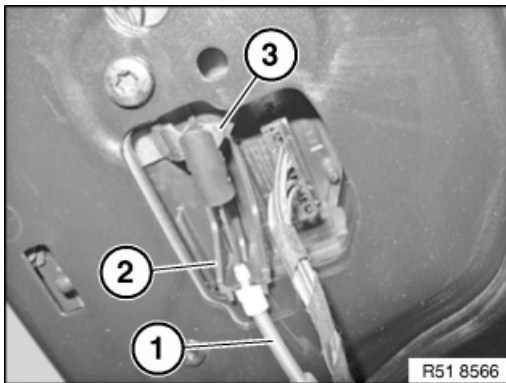
- Protect working area.
- Handle tools and components carefully.



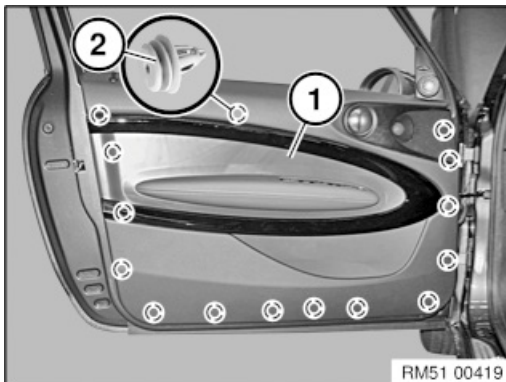
- Correctly attach the Bowden cable (2).
 - If necessary, disassemble the remaining clip (3) on the inner door panel and clip it on the door trim panel (1).
 - Check clips for damage, renew faulty or missing clips, if required.
- The clips (4) are blue, the clips (3) and (5) are white.



- Unclip the weather strip (1) from the door trim panel.
- Install the weather strip (1) on the window cavity (2).

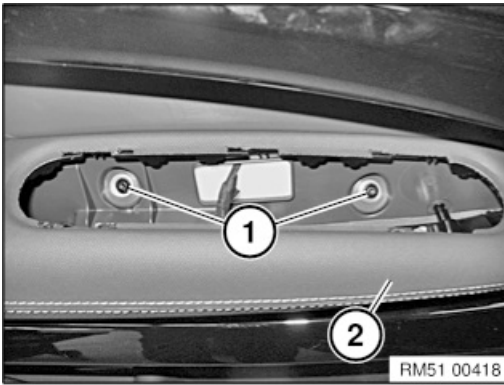


- Attach the Bowden cable (1) of the inside door handle at the door lock (3).
- Attach the Bowden cable (1) on the counter support.
- Connect all connectors.
- Clip in the vehicle wiring harness on the door trim panel.



- Engage the door trim panel (1) in the clips (2).





- Tighten the screw (1) in the door trim panel (2).

• **After installation of the door trim panel:**

- Open side window.
- Check the function of the inside door handle.
- Lock the door with the ignition key.
- Check whether the linkage of the locking button can move freely and align linkage if necessary.

7 – Installing the front door trim panel on the left or right (up to 11/2012)

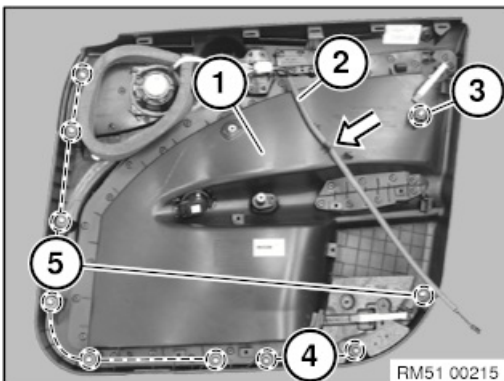


RISK OF DAMAGE

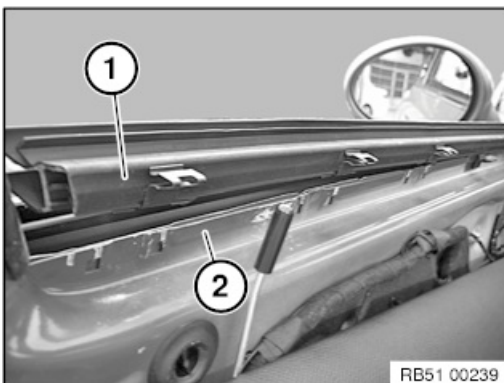
Scratches.

Tools and sharp-edged components can cause scratches.

- Protect working area.
- Handle tools and components carefully.

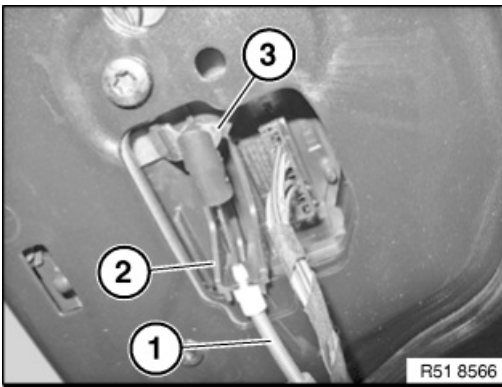


- If necessary, disassemble the remaining clip (3) on the inner door panel and clip it on the door trim panel (1).
- Check clips for damage, renew faulty or missing clips, if required.
The clips (4) are blue, the clips (3) and (5) are white.
- Correctly attach the Bowden cable (2).

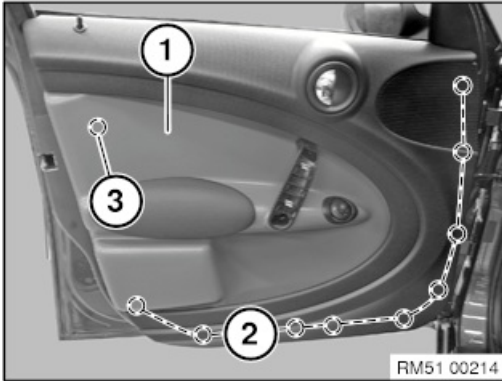


- Unclip the weather strip (1) from the door trim panel.
- Install the weather strip (1) on the window cavity (2).

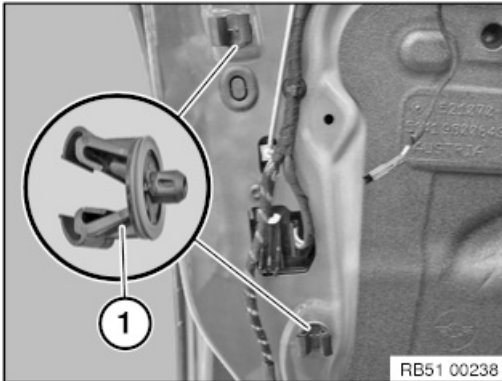




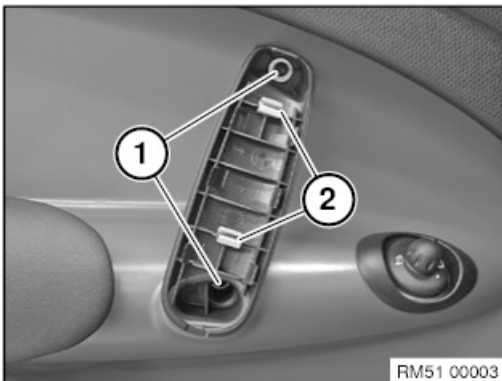
- Attach the Bowden cable (1) of the inside door handle at the door lock (3).
- Attach the Bowden cable (1) on the counter support.
- Connect all connectors.
- Clip in the vehicle wiring harness on the door trim panel.



- Clip the door trim panel (1) at the top into the clamps of the weather strip.
- Press the door trim panel (1) at the marked positions (2) and (3).



- Audibly engage the door trim panel in the clips (1).

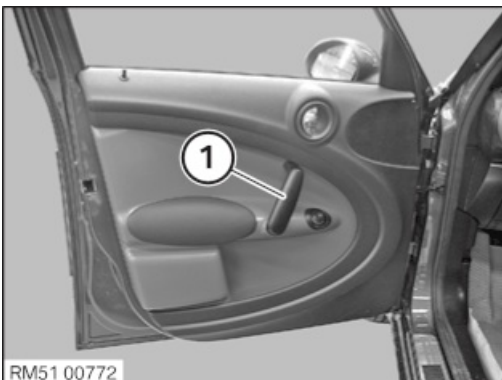


- Tighten the screws (1).

Door trim panel

	4,2 Nm
--	--------

- Check retaining clips for damage, renew faulty or missing retaining clips if required (2).



- Install trim (1).



- **After installation of the door trim panel:**
 - Open side window.
 - Check the function of the inside door handle.
 - Lock the door with the ignition key.
 - Check whether the linkage of the locking button can move freely and align linkage if necessary.

8 – Installing the handle recess in the front door trim panel

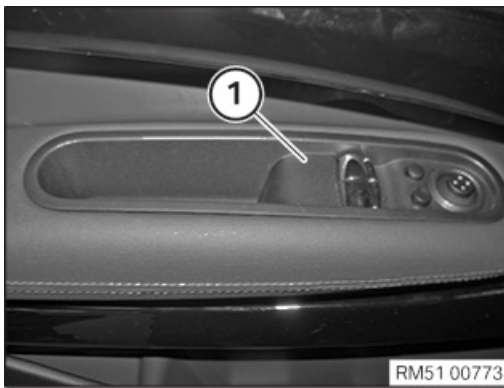


RISK OF DAMAGE

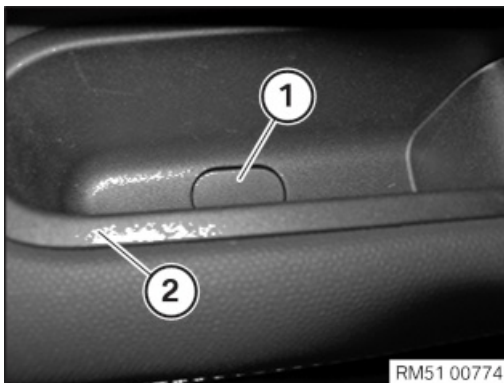
Scratches.

Tools and sharp-edged components can cause scratches.

- Protect working area.
- Handle tools and components carefully.



- Connect associated plug connections.
- Start at the front and clip in the handle recess (1).
- Tighten down screw.



- Clip in the cover (1) into the handle recess (2).

Additional Information

Overview of Tightening Torques

Door trim panel

Used in step 7

4,2 Nm

Overview of Special Tools

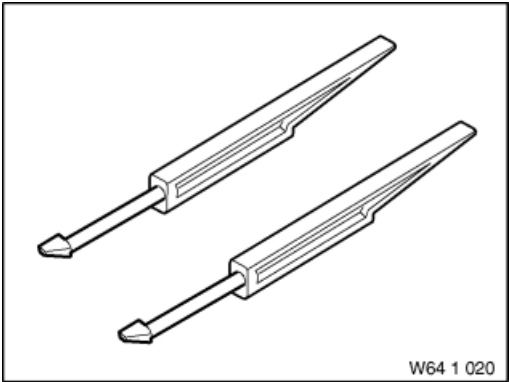


0 496 569 (00 9 325) Wedge



Common		Used in step	123
Usage	(Panel wedge) From 11/2008 this special tool replaces panel wedge 00 9 317 (different material)		
Included in the tool or work	0 490 527		
Storage location	Individual		
Replaced by			
In connection with			
SI-Number	41 01 09 (507)		

0 493 681 (64 1 020) Hook



Common		Used in step	3
Usage	(release hook) For releasing and removing fresh air grille. For removing various covers.		
Included in the tool or work			
Storage location	C2		
Replaced by			
In connection with			
SI-Number	01 15 99 (483)		

Links

General repair instructions	Used in step
51 48 ... Notes for bonding sound insulation (SI), doors	4



51 48 060 Removing and installing/replacing sound insulation in left or right front door



Important!

Instructions for sound insulation are an essential part of these repair instructions and must be followed without fail.

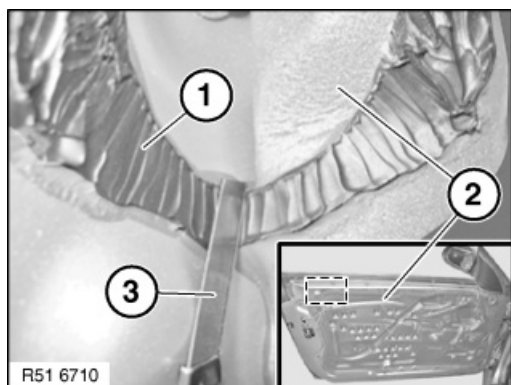
Do not detach sound insulation in jerks (risk of damage).

Ensure watertightness of sound insulation after every repair (water ingress).



Necessary preliminary tasks:

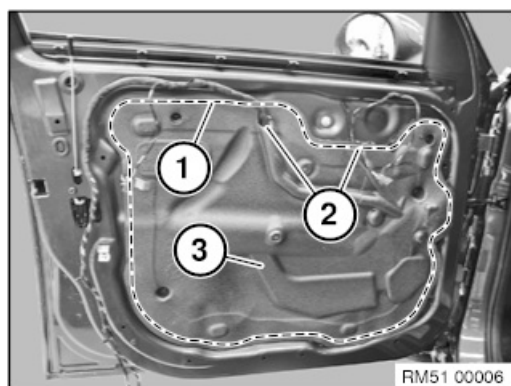
- Remove door trim panel



Important!

When cutting through sealing bead (1), do not damage sound insulation (2) and if necessary cable.

With a suitable sharp cutting tool (3) cut through sealing bead (1) of sound insulation (2) in the area to be detached.



Position of sealing bead (1).

Feed out sound insulation (3) at cables (2) and remove.



Clean adhesive area with adhesive remover (sourcing reference: BMW Parts Department).

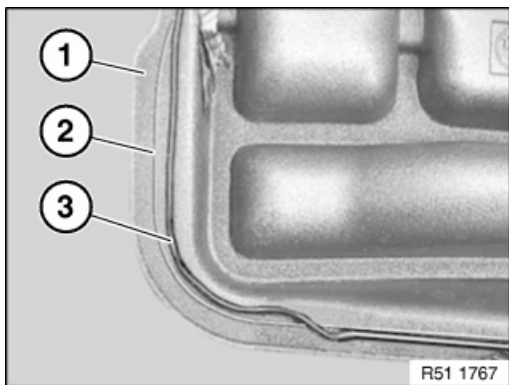
Air drying time: 1 minute

Important!

Bonding surface must be dry and free of dust and grease.

Once it has been cleaned, do not touch the adhesive area with bare hands.





Note:

A mark (2) is provided all round on the sound insulation (1).

Butyl rope (3) rests on or inside the marking (2).



Replacement

Lay 6 mm dia. butyl rope (sourcing reference: BMW Parts Department) in specified adhesive area.

Heat butyl rope (hot air blower) and press down firmly on sound insulation all round.

Contact pressure with hand roller: approx. 20 N/cm²

Manual contact pressure: approx. 10 N/cm²

Note:

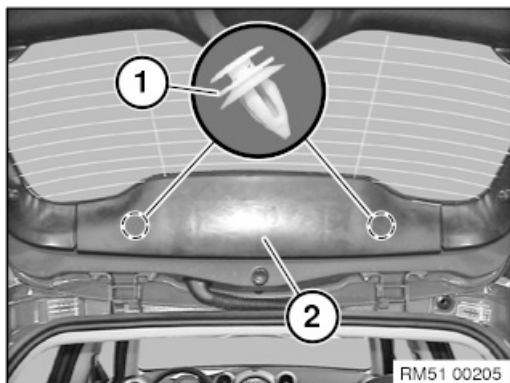
Firm thumb pressure has approx. 30 N/cm²



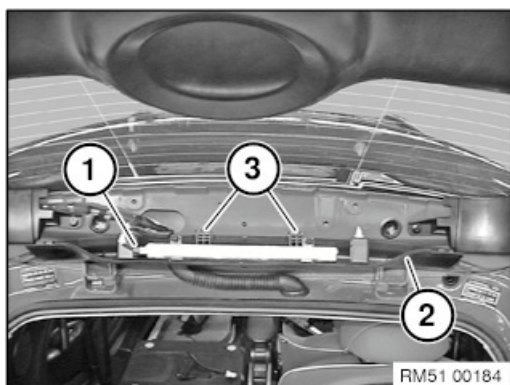
51 49 131 Removing and installing (replacing) upper trim panel for rear window frame



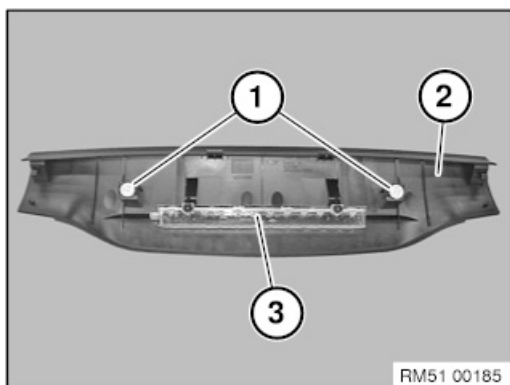
When working on trim panel components, make sure that the sensitive surfaces are not scratched or damaged.



Detach trim panel (2) from clips (1).



Unfasten plug connection (1) and disconnect.
Remove trim panel (2) towards bottom.



Installation note:

Clips (1) of trim panel (2) must not be missing or damaged.

Replacement

Remount brake light (3).



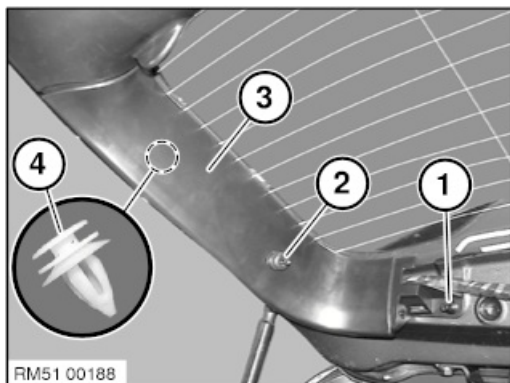
51 49 003 left or right

Removing and installing/replacing cover for rear window frame on



Necessary preliminary tasks:

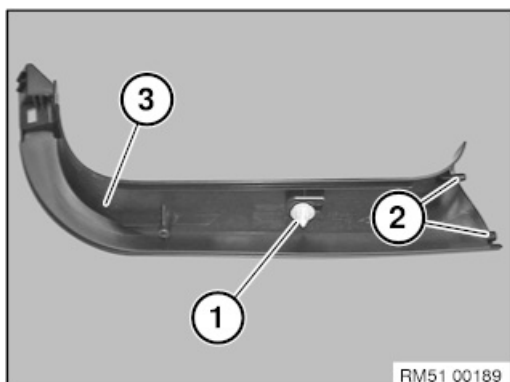
- Remove trim panel for rear window frame at top



Release expanding rivet (1) and screw (2).

Tightening torque 51 49 1AZ.

Detach trim panel (3) from clip (4).



Installation note:

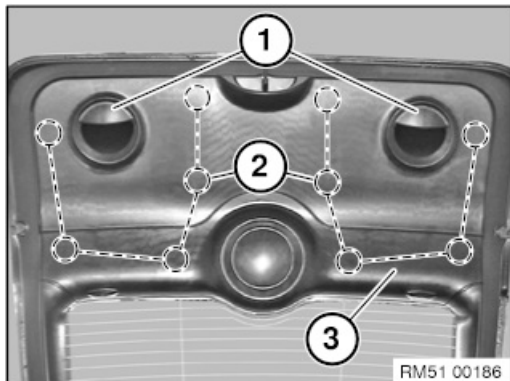
Replace clip (1).

Guide (2) on trim panel (3) must not be damaged.



**Necessary preliminary tasks:**

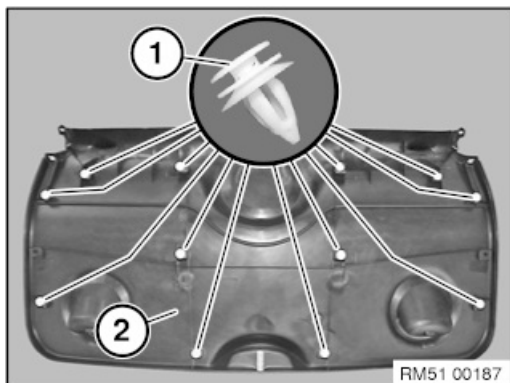
- Remove both covers for rear window frames



Release screws (1) in handle recess.

Tightening torque 51 49 2AZ.

Release trim panel (3) from clips (2) and remove.

**Installation note:**

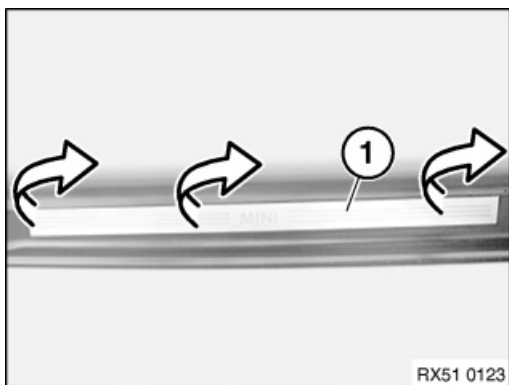
Replace faulty clips (1) on trim panel (2).





Important!

The notes on component bonding with double-sided adhesive tape serve as the basis for these repair instructions and must be observed without fail.



Detach cover (1) and dispose of it. *Installation note:*

Clean bonding surface.

Stick on the new cover (1).

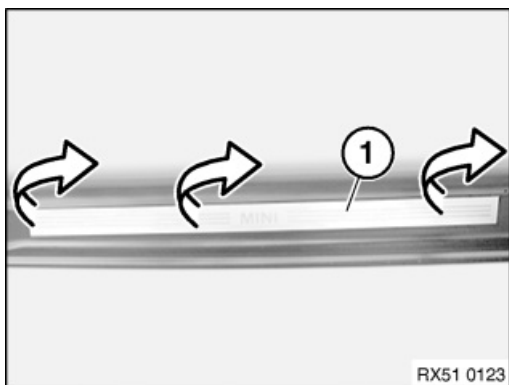


51 47 072 Removing and installing/replacing finishing strip at rear left or right entrance



Important!

The notes on component bonding with double-sided adhesive tape serve as the basis for these repair instructions and must be observed without fail.



Detach cover (1) and dispose of it. *Installation note:*

Clean bonding surface.

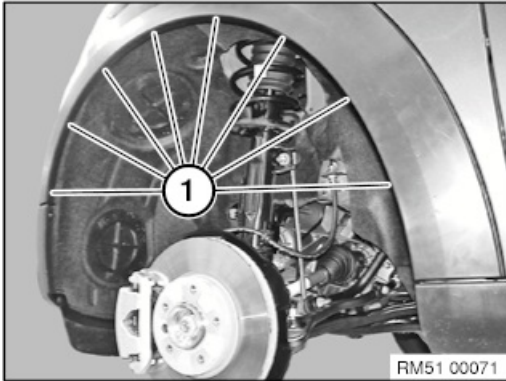
Stick on the new cover (1).





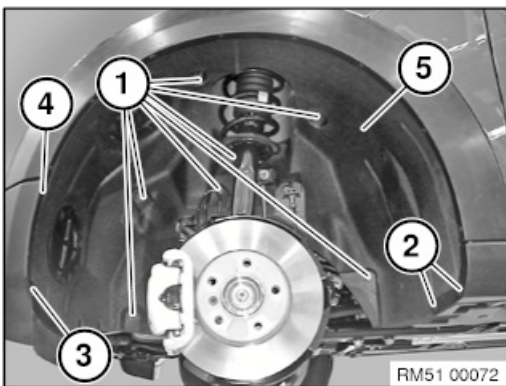
Necessary preliminary tasks:

- Remove front wheel



Release expanding rivets (1).

Installation note: Replace expanding rivets (1).

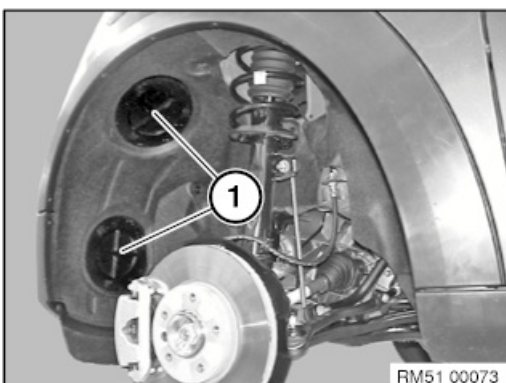


Release screw rivets (1).

Release expanding rivet (3).

Release screws (2 and 4).

Remove wheel arch cover (5).



Replacement:

If necessary, modify lid (1)

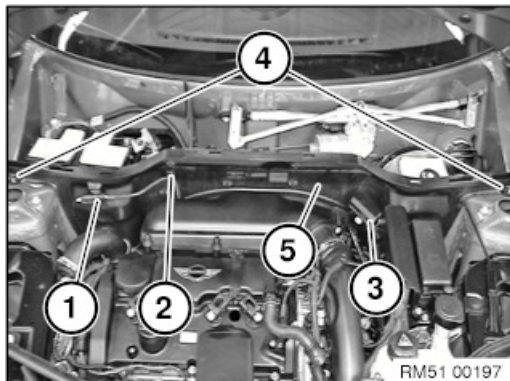


51 71 ... Removing and installing/replacing heater end panel



Necessary preliminary tasks:

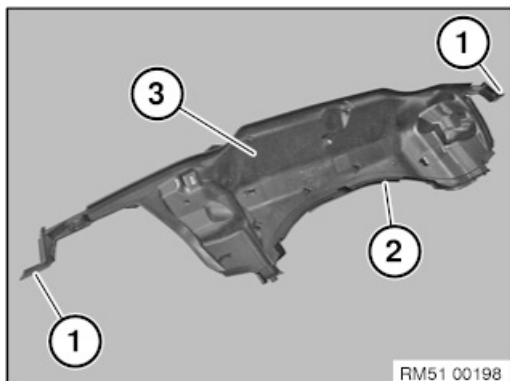
- Remove left/right cowl panel cover



Release line clip (1) and (2).

Detach fuse carrier (3).

Loosen nuts (4) and remove end panel (5) from above.



Installation note:

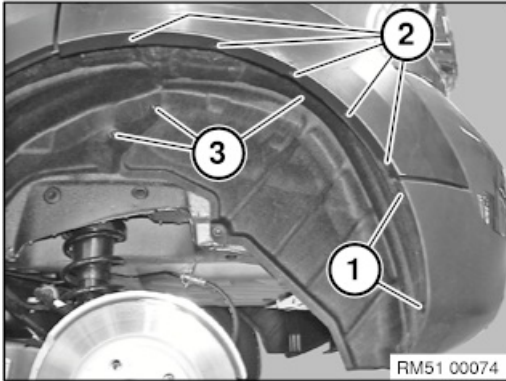
Holder (1) and sealing lip (2) on end panel (3) must not be damaged or missing.





Necessary preliminary work:

- Remove rear wheel

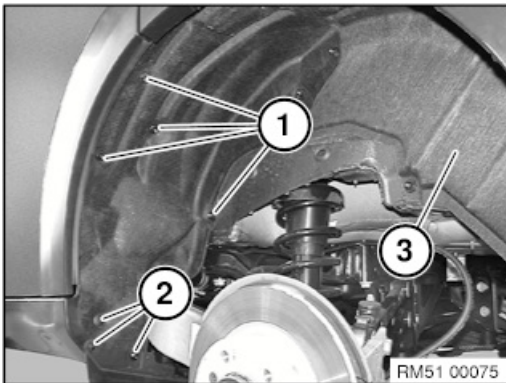


Release screws (1).

Release expanding rivets (2).

Unscrew nuts (3).

Installation note: Replace expanding rivets.



Unscrew nuts (1).

Release expanding rivets (2).

Remove wheel arch cover (3).

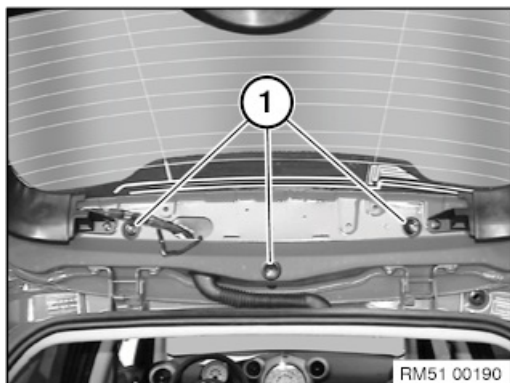
Installation note:

Replace expanding rivets (2).

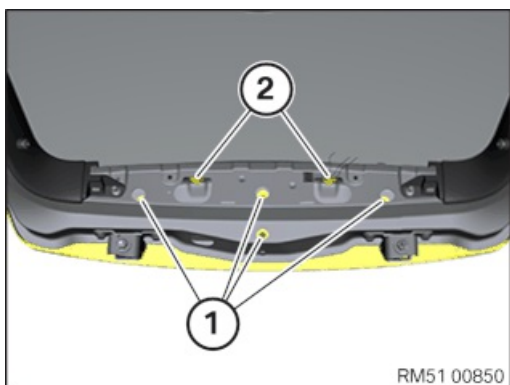


**Necessary preliminary tasks:**

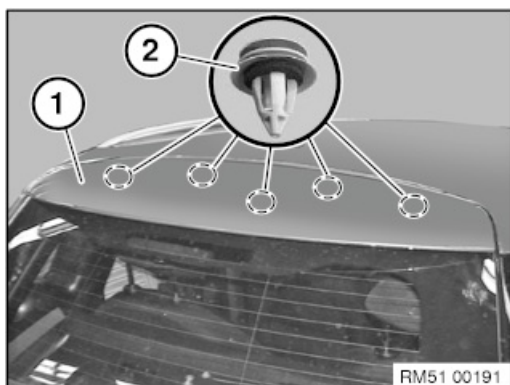
- Remove trim panel for rear window frame upwards
- Remove aerial amplifier (**version till 07/2012**)

**Build date up to 07/2012:**

Lever out seal plugs (1) and release screws underneath.
Tightening torque 51 71 7AZ .

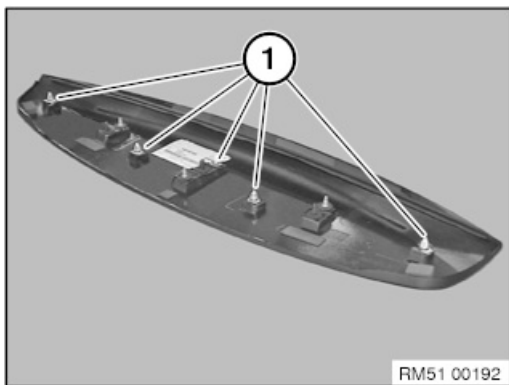
**Version after 07/2012:**

Lever out sealing plugs and unscrew nuts (1) underneath.
Unfasten screws (2).
Tightening torque 51 71 7AZ.



Detach rear spoiler (1) in upward direction from clips (2).

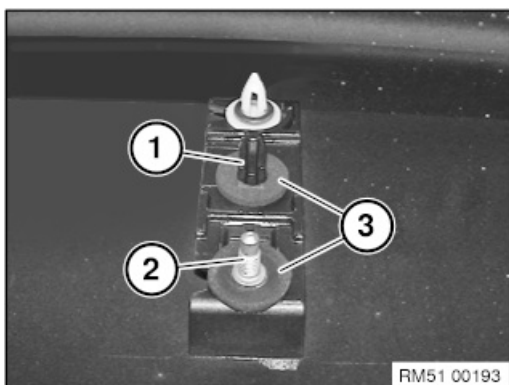




Installation note:

Renew faulty clips (1)

Check welded connection of inner and outer shells are free of damage (visual inspection).



Guide (1), bolts (2) and gaskets (3) must not be damaged or missing.



51 71 447 Removing and installing/replacing trim panel for cover on frame side member (left or right)



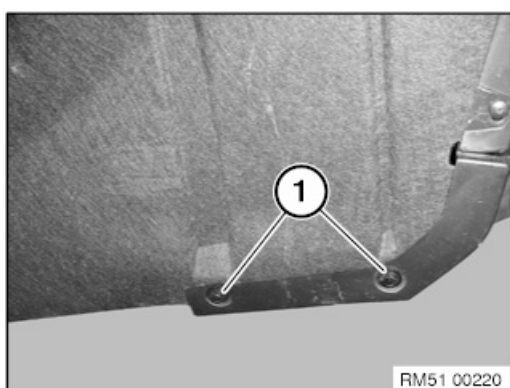
Special tools required:

- 00 9 325

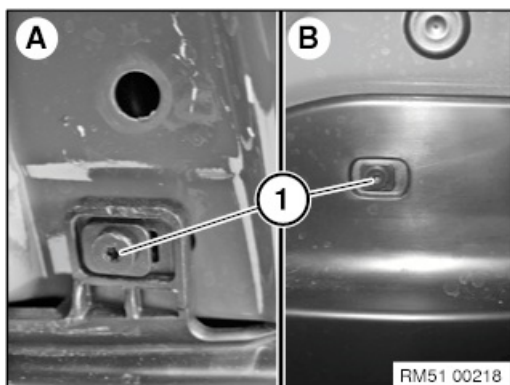


Necessary preliminary work:

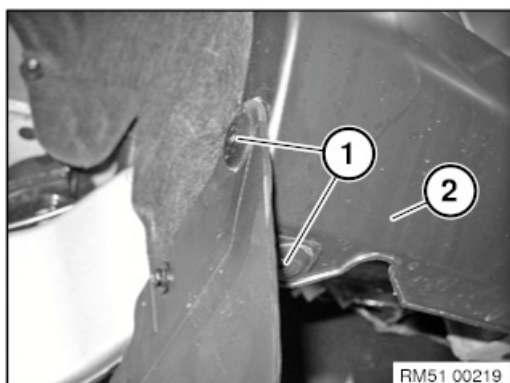
- Remove front wheel arch trim in area of trim panel for frame side member



Release screws (1) at front of wheel arch.

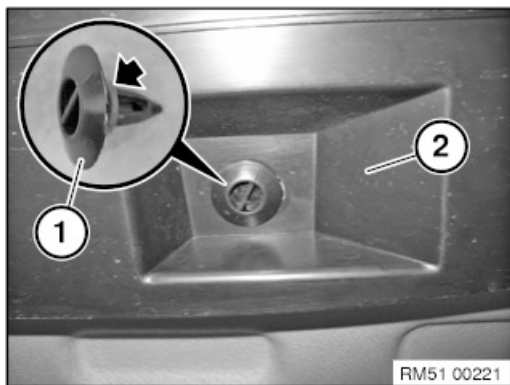


Release expanding rivet (1) at front (A) and rear (B). *Installation note:* Replace defective expanding rivet (1).

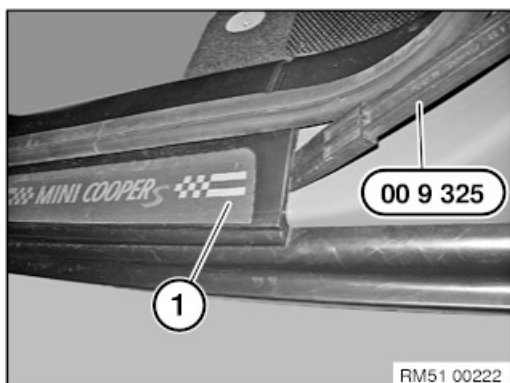


Release expander rivets (1) on rear of trim panel (2) for frame side member. *Installation note:* Replace expanding rivets (2).

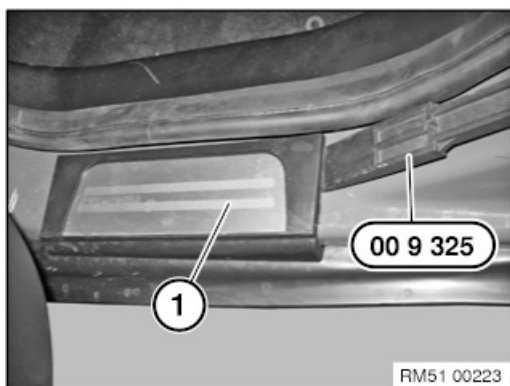




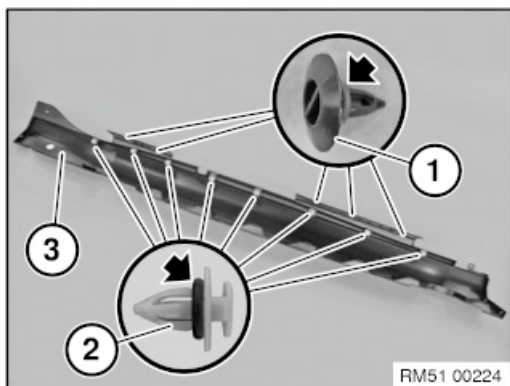
Release clips (1) along bottom of trim panel for frame side member (2). *Installation note:*
Clip (1) must be installed with seal.



Lever out top front of trim panel for frame side member (1) at entrance with special tool 00 9 325. *Note:*
Considerable effort is required to lever out the panel.



Lever out top rear of trim panel for frame side member (1) at entrance with special tool 00 9 325. *Note:*
Considerable effort is required to lever out the panel.



Unclip trim panel for frame side member (3) and detach.

Installation note:

Clips (1) and (2) must not be damaged or missing. Seal must be installed.

Clip (1) = black

Clip (2) = white

Replacement

- Also order front and rear sill trim panels
- Reinstall clips (1) and (2).





Note:

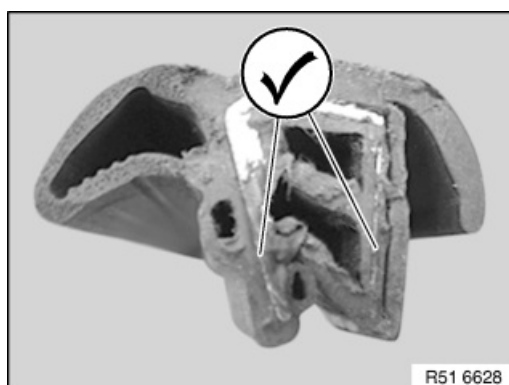
The utmost care must be taken when removing all sealings on the vehicle. Incorrect fitting can lead to wind noise and water ingress among other things and can affect the ease of closing and opening.



The following instructions only apply to sealing without sealant.

Sealings with sealant must be replaced each time they are disassembled.

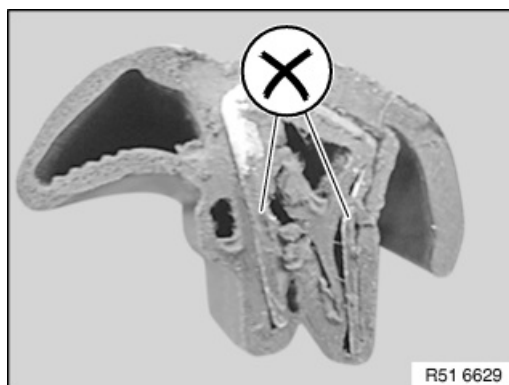
Sealing surfaces must be cleaned.



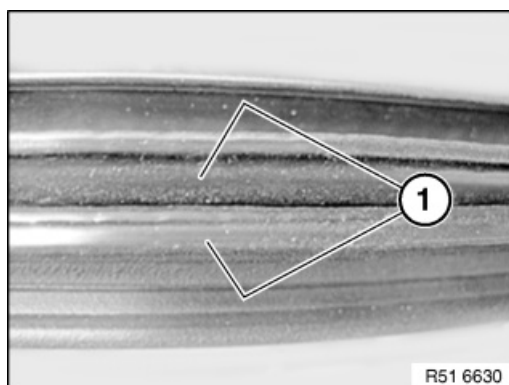
- In general, the following applies:

Sealings on the side frame can be fitted and removed any number of times.

- Sealings must not be damaged or torn.
- The clamping surface must be compressed by hand far enough to ensure that a tight connection on the side flange is still possible. The sealing shanks may touch each other slightly. A completely compressed sealing is not permitted.

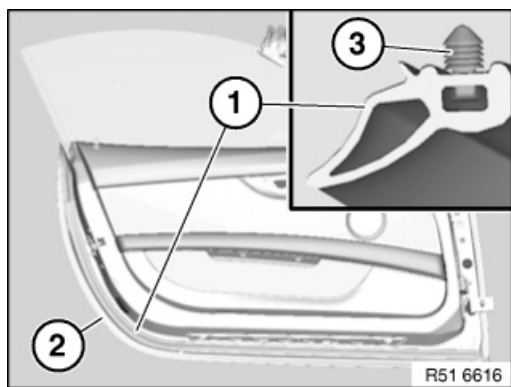


- It is not necessary to use special tools to compress the clamping surface. This can be done carefully by hand.
- The sealings must always be fitted except in the case of blockages. There is no defined contact pressure.
- A new gasket must be fitted if sealings in the tailgate area are repeatedly fitted and removed (water ingress due to cracked sheet metal).
- Sealings must be checked for correct fit after installation. If necessary, sealings should be lifted over the adjacent components using the appropriate tool. Neighbouring components must not be damaged.
- Sealings must be replaced if the metal inlay of the sealing is visible (corrosion).



- Ensure the clamping surface is even all round.





- Sealings that are installed with plastic clips fit tightly against the body. If this is not the case, replace the clips or sealings.



**Note:**

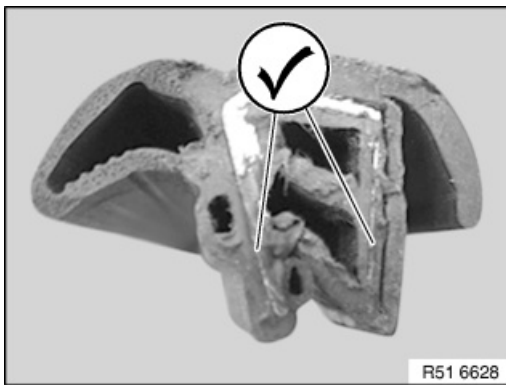
The utmost care must be taken when removing all sealings on the vehicle. Incorrect fitting can lead to wind noise and water ingress among other things and can affect the ease of closing and opening.



The following instructions only apply to sealing without sealant.

Sealings with sealant must be replaced each time they are disassembled.

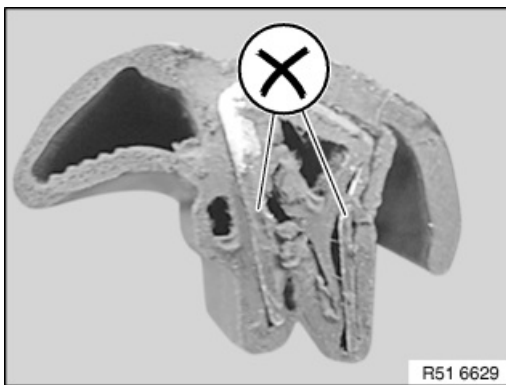
Sealing surfaces must be cleaned.



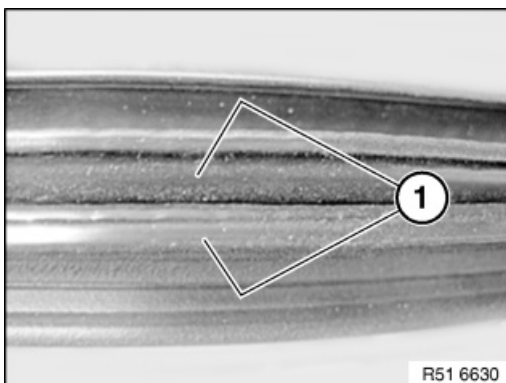
- In general, the following applies:

Sealings on the side frame can be fitted and removed any number of times.

- Sealings must not be damaged or torn.
- The clamping surface must be compressed by hand far enough to ensure that a tight connection on the side flange is still possible. The sealing shanks may touch each other slightly. A completely compressed sealing is not permitted.

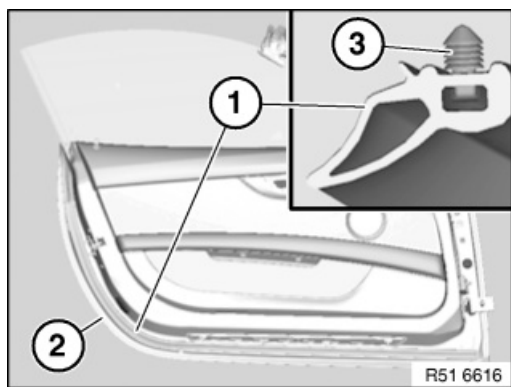


- It is not necessary to use special tools to compress the clamping surface. This can be done carefully by hand.
- The sealings must always be fitted except in the case of blockages. There is no defined contact pressure.
- A new gasket must be fitted if sealings in the tailgate area are repeatedly fitted and removed (water ingress due to cracked sheet metal).
- Sealings must be checked for correct fit after installation. If necessary, sealings should be lifted over the adjacent components using the appropriate tool. Neighbouring components must not be damaged.
- Sealings must be replaced if the metal inlay of the sealing is visible (corrosion).



- Ensure the clamping surface is even all round.



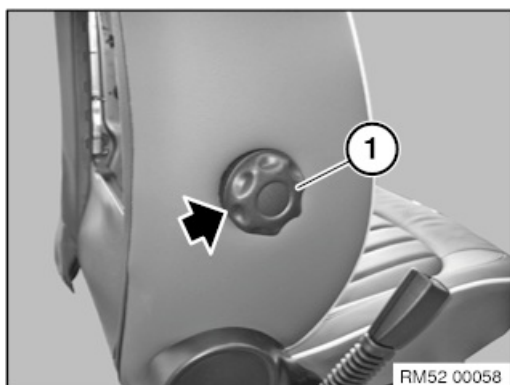


- Sealings that are installed with plastic clips fit tightly against the body. If this is not the case, replace the clips or sealings.

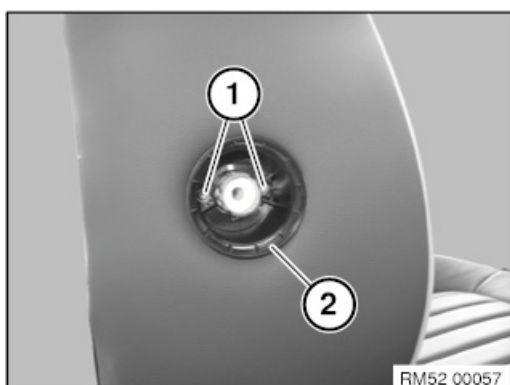


**Necessary preliminary work:**

- Turn the lumbar support hand wheel so that the least possible lumbar support results.
- Remove rear panel on front seat backrest
- Partially remove backrest cover

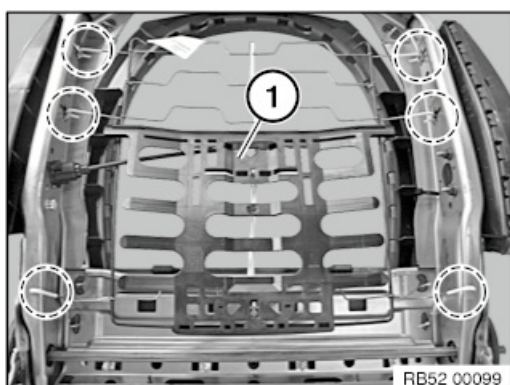


Lever out cover (1) with plastic wedge



Release screws (1).

Remove insert (2) for handwheel.



Disengage the spring wire from backrest frame.

Remove the lumbar support (1) with spring wire.

Installation note:

Run a function check.



52 13 198 Remove/fit/replace the rear wall at the front seat backrest on the left and right (up to 09/09)



Warning!

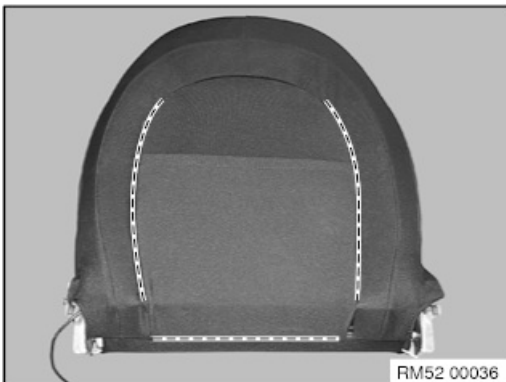
Seat and backrest frame of front seats have very sharp edges.
Danger of injury and damage!



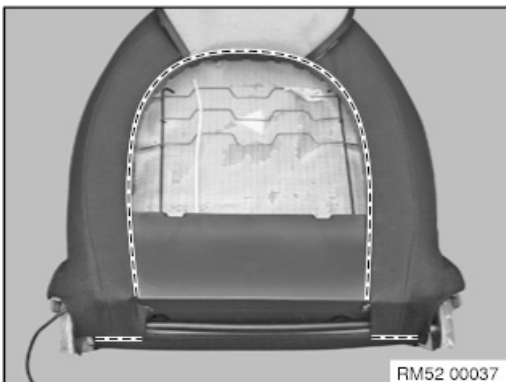
Warning!

Observe safety regulations when handling airbag modules.
Incorrect handling can activate airbag and cause injury.

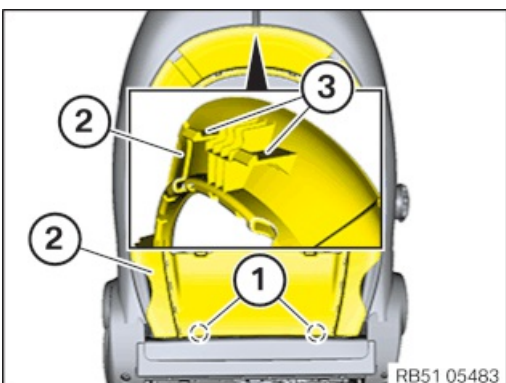
Switch off the ignition!



Lever out welt in marked area of rear panel.



Lever out welt in marked area of rear panel.



Loosen screws (1).

Detach rear panel (2) on the retaining lugs (3) and feed out downwards.



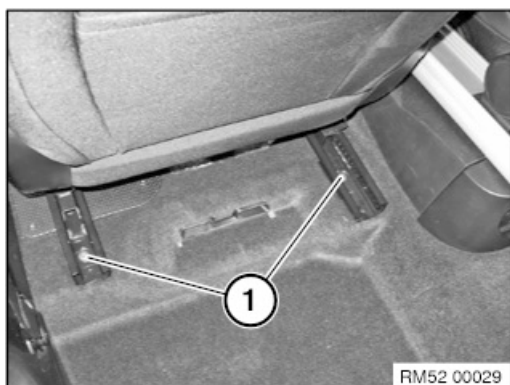
**Warning!**

Observe safety regulations for handling airbag modules and pyrotechnical seat belt tensioners.

Incorrect handling may trigger off pyrotechnical belt tensioners or the side airbag, which may result in injury.

**Necessary preliminary work:**

- Switch off ignition
- Disconnect battery earth lead



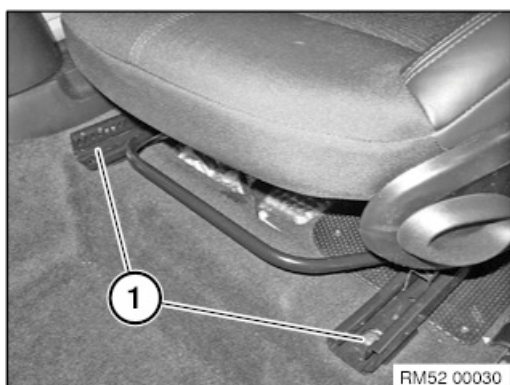
Slide front forward as far as it will go.

Release screws (1).

Installation note:

Replace screws.

Tightening torque 52 13 1AZ.



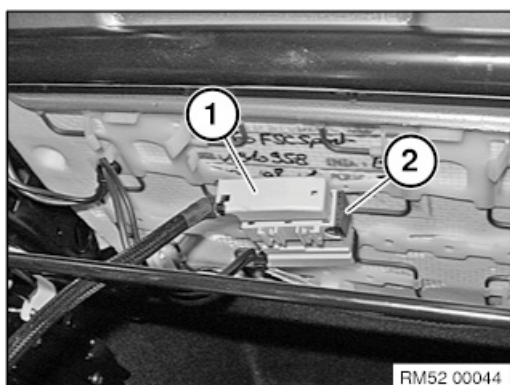
Slide front seat back as far as it will go.

Release screws (1).

Installation note:

Replace screws.

Tightening torque 52 13 1AZ.



Unlock plug connections (2) and disconnect connector (1).





Important!

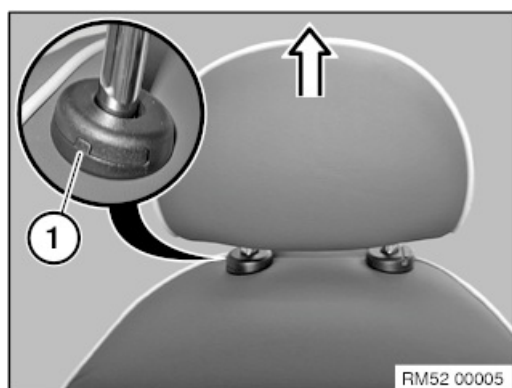
Cover entrance for protection purposes (risk of damage).

Lift out front seat.



52 13 390 restraint

Removing and installing or replacing front left or right head

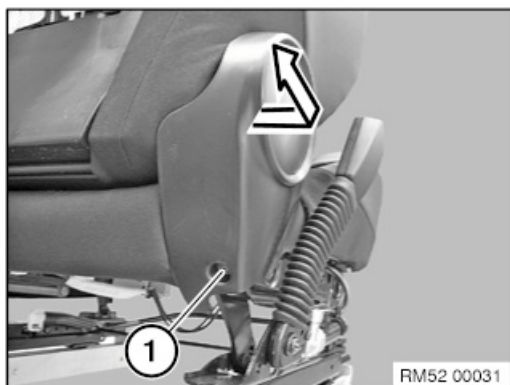


Move complete head restraint up as far as possible.
Press release (1) and pull out head restraint.



52 13 041 front seat

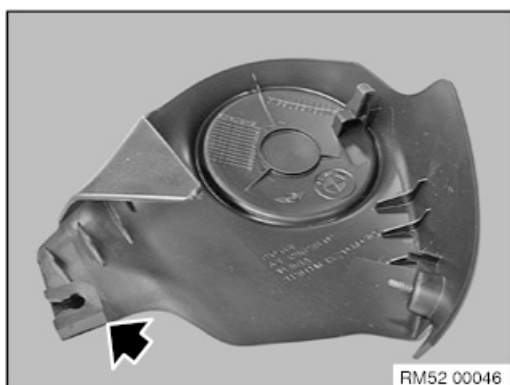
Removing and installing or replacing inner cover on left or right



Release screw (1).

Tightening torque 52 13 09AZ.

Remove cover in direction of arrow.



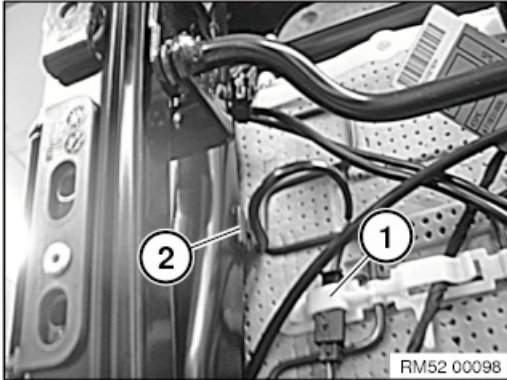
Installation note:

Make sure the cover is correctly seated on the seat mechanism.

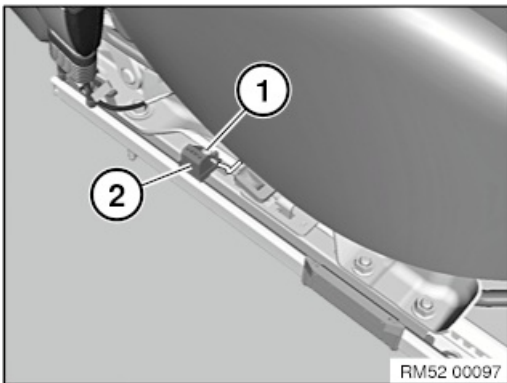


**Necessary preliminary tasks:**

- Remove front seat



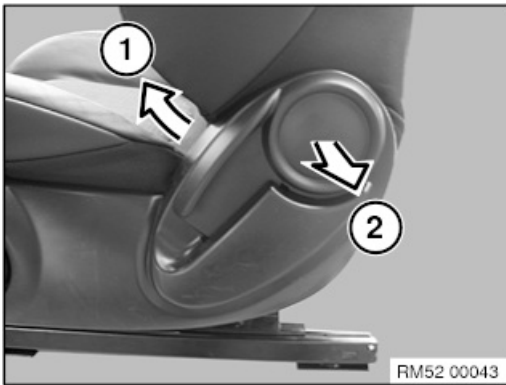
Unfasten plug connection (1) and disconnect.
Pull the metal clamp (2) off the seat mechanism.



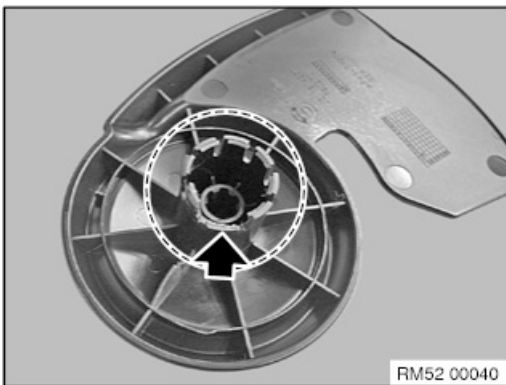
Release screw (1).
Remove position switch (2).



52 13 031 Removing and installing/replacing backrest adjustment lever on left or right front seat



1. Pull up lever upwards.
2. Firmly unclip lever from linkage.



Installation note:

The latch mechanism of the lever must not be damaged.
Replace lever if necessary.

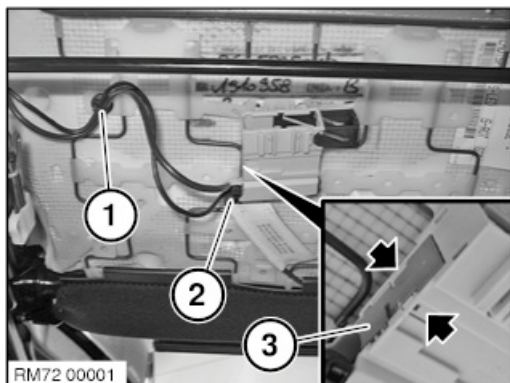


**Necessary preliminary work:**

- Remove front seat
- Remove outer cover
- Remove inner cover

*Installation note:*

- Microencapsulated screws (Loctite) must be replaced and may not be reused
- Screw connection must be completed within 20 minutes (start of hardening)
- Microencapsulated screws must not be retightened
- Clean thread of nut beforehand in event of repeated use



Detach cable straps (1) on clip.

Detach cable straps (2) on connector housing.

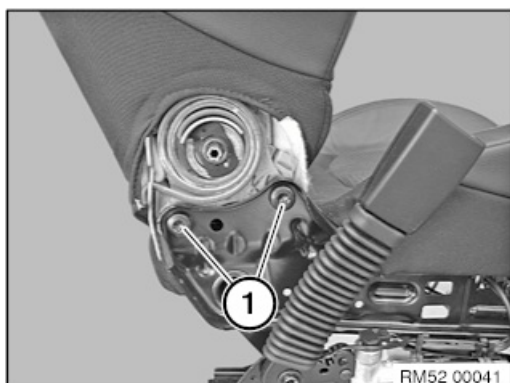
Unlock connector (3) and pull out of connector housing.

Feed wiring harness of airbag module out of seat mechanism.

Installation note:

Connector is coded against incorrect assembly.

Replace faulty cable straps.



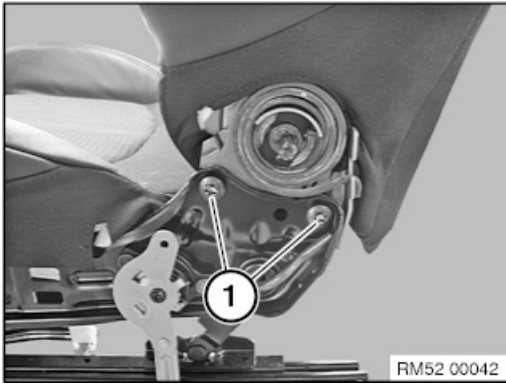
Release screws (1).

Tightening torque 52 13 03AZ.

Installation note:

Replace microencapsulated screws.





Release screws (1).

Tightening torque 52 13 03AZ.

Installation note:

Replace microencapsulated screws.

Remove backrest frame from seat mechanism.



Replacement only:

If necessary, remove lumbar support.

Remove backrest cover.

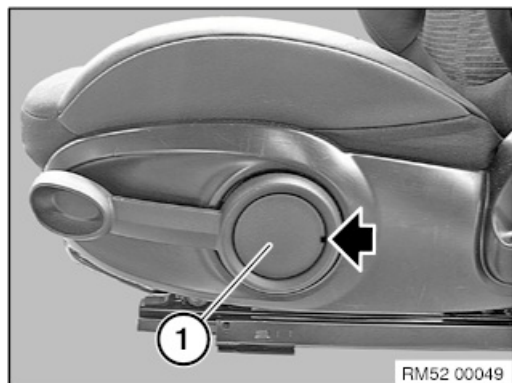
Remove side airbag.



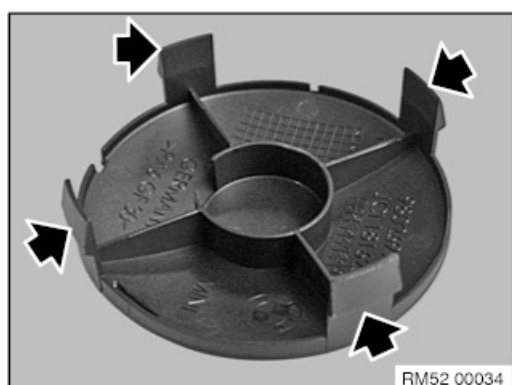


Necessary preliminary work:

- Remove lever for backrest adjustment on front seat



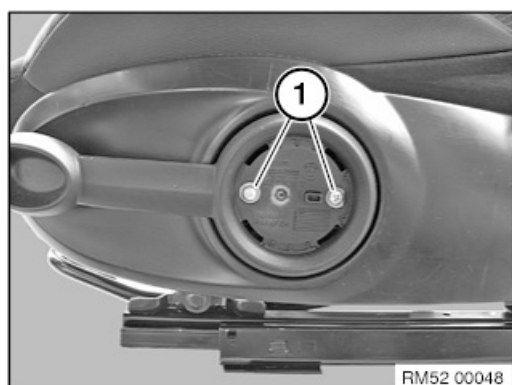
Unclip cover (1).



Installation note:

Retaining lugs must not be damaged.

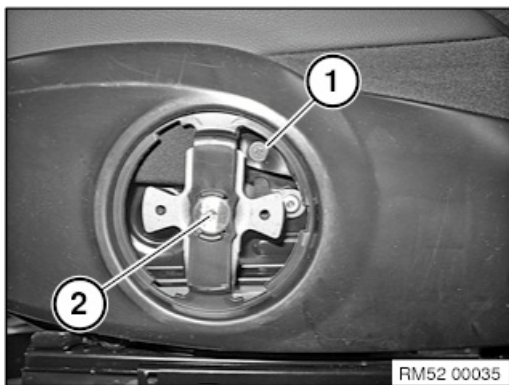
If necessary, replace faulty cover.



Release screws (1).

Tightening torque 52 13 08AZ.

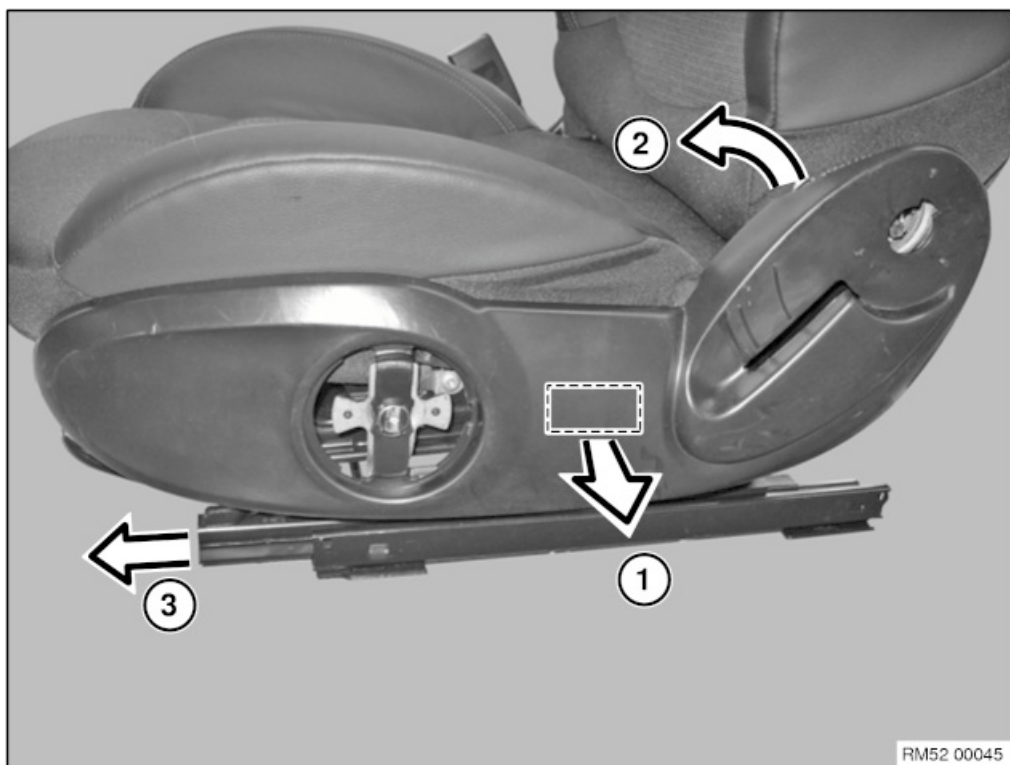




Release screw (1).
Tightening torque 52 13 09AZ.
Release screw (2).
Installation note:
Insert screw (2) with Loctite.

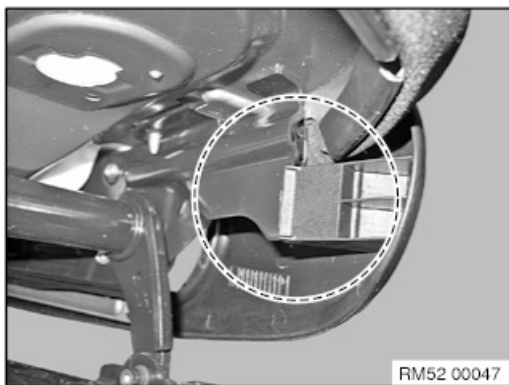


Release screw (1).
Tightening torque 52 13 09AZ.



1. Unclip cover in marked area.
2. Swing cover upwards to disengage tab of seat mechanism.
3. Remove cover towards front.





Installation note:

First apply the front cover to the seat mechanism.

Make sure cover is correct seated on the seat mechanism (marked area).



52 26 045 Removing and installing/replacing seat frame for left or right rear seat (4-seater)



Necessary preliminary tasks:

- Remove backrest



Replacement only:

- Remove seat cover
- Remove the lower strap



52 26 039
(5-seater)

Removing and installing/replacing seat frame for rear seat, right



Necessary preliminary tasks:

- Remove backrest



Replacement only:

- Remove seat cover
- Remove the lower strap



52 13 020 seat

Removing and installing/replacing seat frame on left or right front



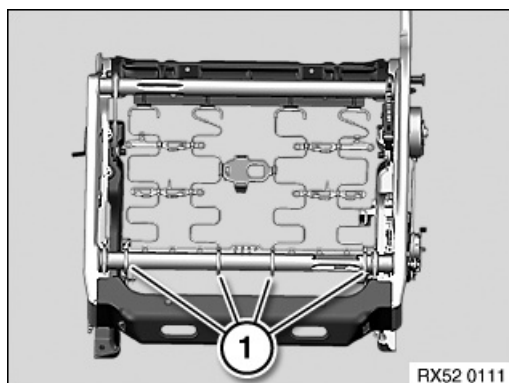
Necessary preliminary work:

- Remove seat cover



Replacement only:

- Remove seat belt tensioner



If necessary, disengage springs (1) from seat frame.



**Special tools required:**

- 52 0 050

**Necessary preliminary work:**

- Remove backrest
- Remove head restraint

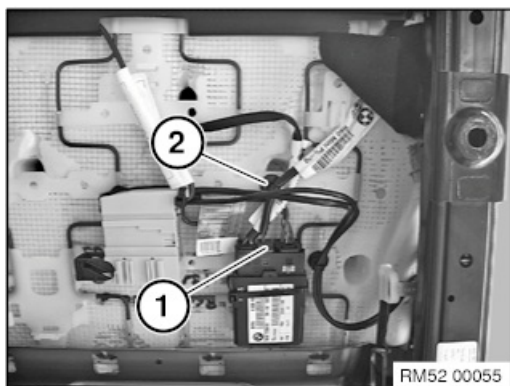
**Warning!**

Seat and backrest frame of front seats have very sharp edges.
Danger of injury and damage!

**Warning!**

Observe safety regulations when handling airbag modules.
Incorrect handling can lead to airbag deployment and cause injury.

Switch off the ignition!

Version with seat heating:

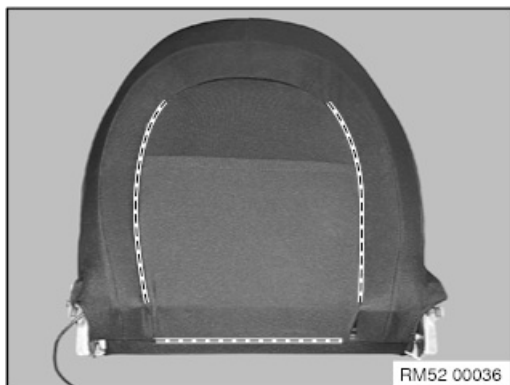
Unfasten plug connection (1) and disconnect.

Cut open cable strap (2).

Installation note:

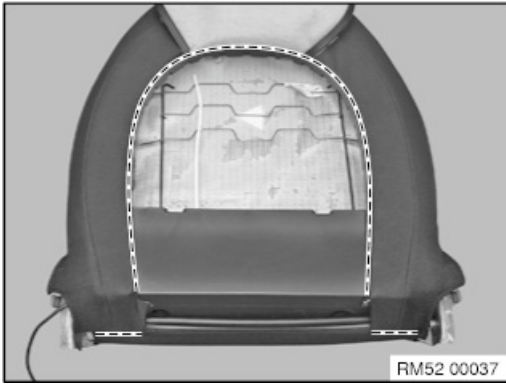
Connector is coded against incorrect assembly.

Replace defective cable strap.

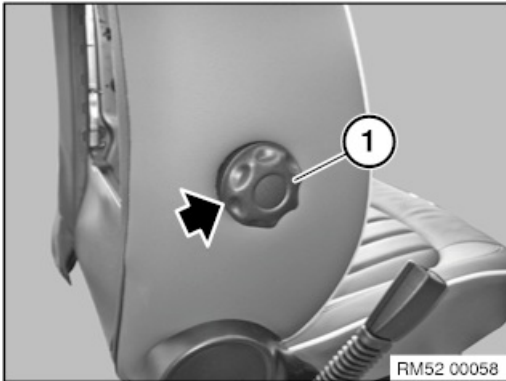


Lever out welt in marked area of rear panel.

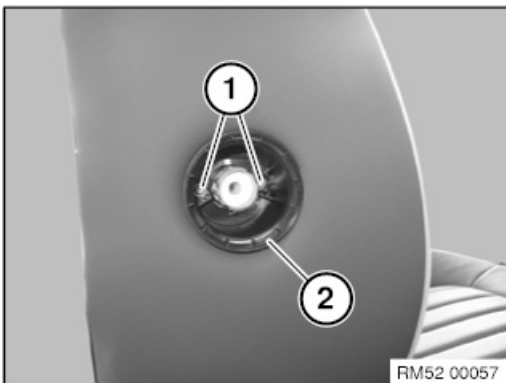




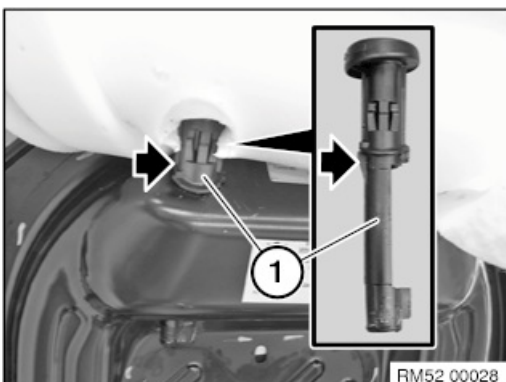
Lever out welt in marked area of rear panel.



Lever out cover (1) with plastic wedge

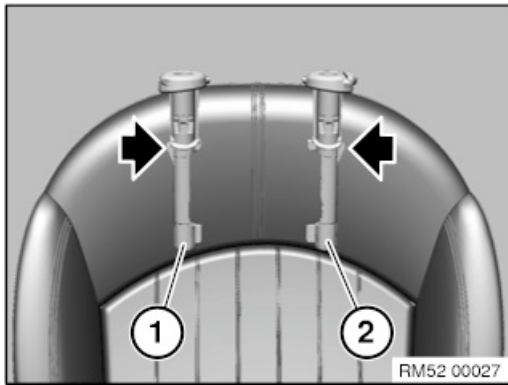


Release screws (1).
Remove insert (2) for handwheel.



Fold the backrest cover upwards to expose the working area.
Press in retaining lug and remove guide sleeve upwards.
Remove backrest cover with upholstery from backrest frame.

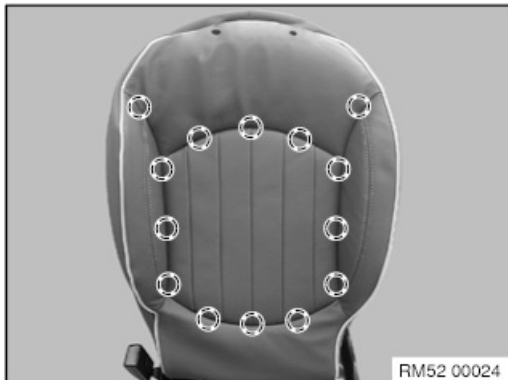




Installation note:

Retaining lugs must point outwards.

1. Guide sleeve without button
2. Guide sleeve with button

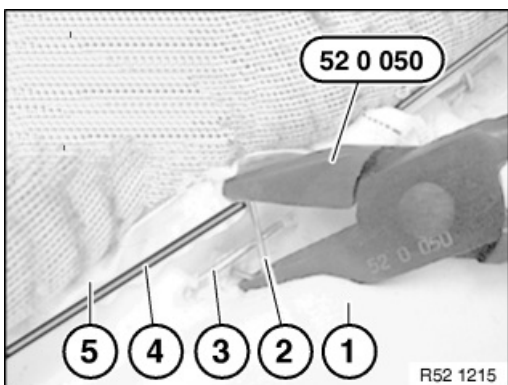


Release all clamps in marked area.

Remove seat cover from upholstery.

Important!

Remove all remnants of clamps from seat cover and upholstery.



Installation note:

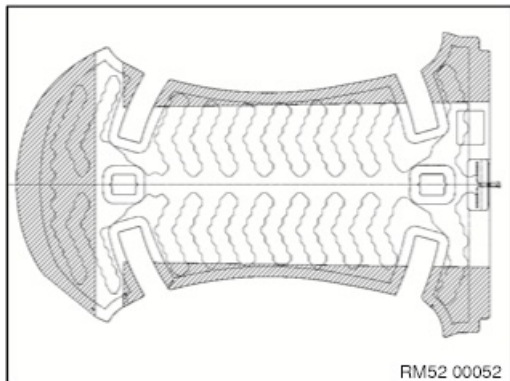
Insert new clamp (2) with special tool 52 0 050 and bend closed.

1. Upholstery
2. Clamp
3. Trim wire in upholstery
4. OKE strip in backrest cover
5. Backrest cover



**Necessary preliminary work:**

- Detach backrest cover from padding

*Note:*

Heating element is partially bonded to foam part and they can be separated from each other without incurring damaged if handled carefully.

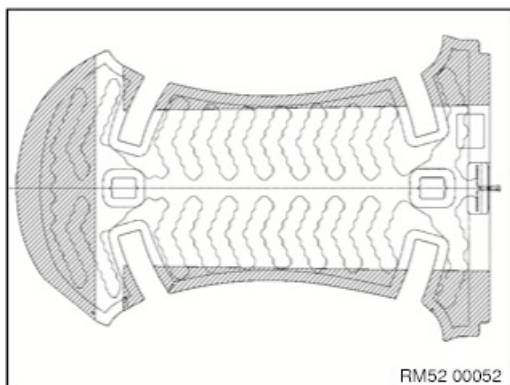
Carefully pull off heating element in marked area from foam part.

Check foam part:

- No obvious damage or material defects
- No bubbles in foam part
- No dirt contamination on foam part or residual foam

Check heating mat:

- No obvious damage or material defects
- All tear-off film pieces presents
- Note version by examining label on cable

*Installation note:*

Guide cable for backrest heating through foam hole.

Stick on heating element:

- Pull off adhesive film from heating element and stick onto edge of foam part until flush
- Press down evenly in outwards direction

Check routing of heating element for:

- Heating element laid without folds
- Heating element correctly positioned
- All bonding surfaces stuck on

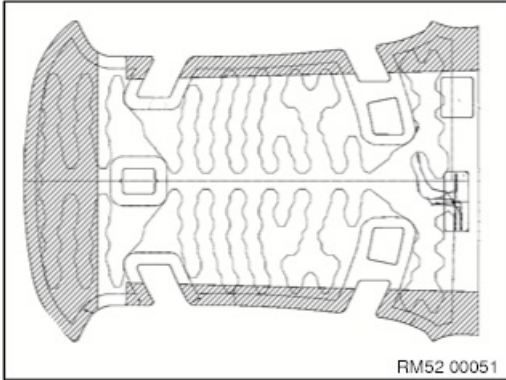
Note:

Carry out functional check.



**Necessary preliminary work:**

- Detach seat cover from padding

*Note:*

Heating element is partially bonded to foam part and they can be separated from each other without incurring damaged if handled carefully.

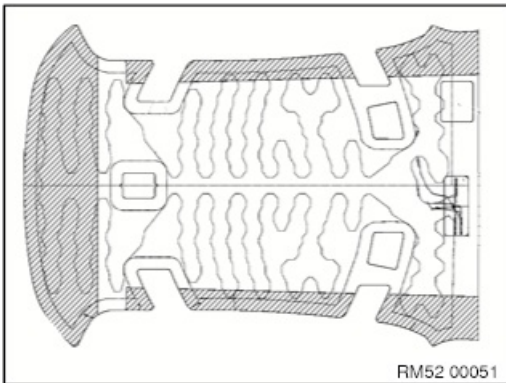
Carefully pull off heating element in marked area from foam part.

Check foam part:

- No obvious damage or material defects
- No bubbles in foam part
- No dirt contamination on foam part or residual foam

Check heating mat:

- No obvious damage or material defects
- All tear-off film pieces presents
- Note version by examining label on cable

*Installation note:*

Guide cable for backrest heating through foam hole.

Stick on heating element:

- Pull off adhesive films from heating element and stick onto edge of foam part until flush
- Press down evenly in outwards direction

Check routing of heating element for:

- Heating element laid without folds
- Heating element correctly positioned
- All bonding surfaces stuck on

Note:

Carry out functional check.





Only US version / Canadian version front passenger seat (with seat occupancy mat):

Faulty seat cover:

The seat cover, facing and seat occupancy mat must be completely replaced.

The new seat cover is supplied with facing, seat occupancy mat and if applicable seat heating.

Faulty seat occupancy mat or facing:

Both parts can only be replaced together.

After installation, the seat occupancy mat must be enabled with the BMW programming system.



The operation for removing the facing without seat occupancy mat is described in:

- Replacing seat cover on left or right front seat.



Enabling the seat occupancy detection (seat occupancy mat):

- Connect BMW programming system
- Encode airbag control unit
- Delete fault memory if necessary

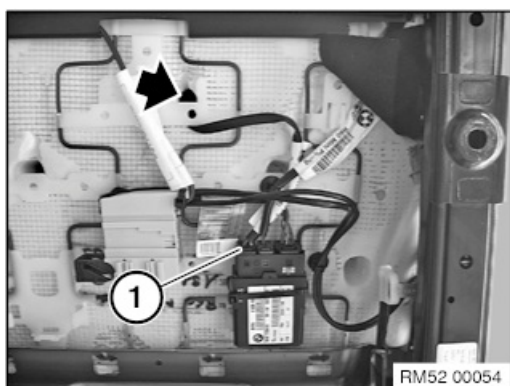


**Special tools required:**

- 52 0 050

**Necessary preliminary work:**

- Remove front seat
- Remove inner cover
- Remove outer cover
- Removing backrest frame

Version with seat heating:

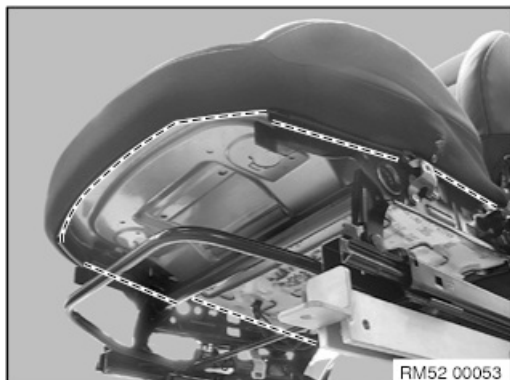
Unfasten plug connection (1) and disconnect.

Installation note:

Connector is coded against incorrect assembly.



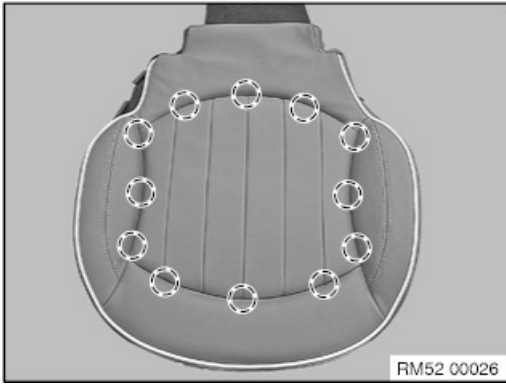
Lever out welt in marked area.



Lever out welt in marked area.

Remove padding with seat cover from seat mechanism.



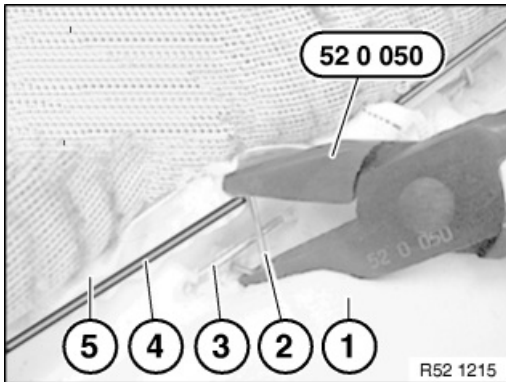


Release all clamps in marked area.

Remove seat cover from upholstery.

Important!

Remove all remnants of clamps from seat cover and upholstery.



Installation note:

Insert new clamp (2) with special tool 52 0 050 and bend closed.

1. Upholstery
2. Clamp
3. Trim wire in upholstery
4. OKE-strip in seat cover
5. Seat cover



**Special tools required:**

- 52 0 050

**Necessary preliminary tasks:**

- Remove front seat
- Remove inner cover
- Remove outer cover
- Removing backrest frame

**Warning!**

Only US and Canadian version of front passenger seat (with CIS mat):

A defective seat cover can be replaced separately from the upholstery and CIS mat.

A faulty CIS mat, seat heating or upholstery can only be replaced as a single unit.

New CIS mat is supplied with upholstery and if necessary seat heating.

Full functional capability can only be guaranteed with original BMW spare parts.

After fitting the seat cover, the CIS mat must be enabled with the BMW programming system.

**Warning!**

Only US and Canadian version of front passenger seat (with CIS mat):

To avoid damaging the CIS mat, it is essential to carry out the following operations with extra care.

**Important!**

Risk of damage on sharp-edged seat mechanism.

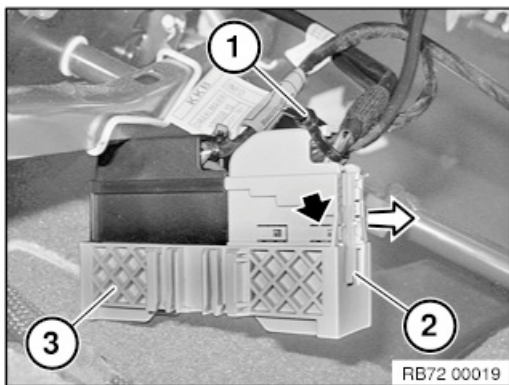
Guide all cables carefully through seat and backrest mechanism.

Make sure cable is routed without kinks and tension.

Make sure plug connections are correctly locked.

Make sure connectors are correctly seated in latch mechanisms.





Version with seat occupancy detection (CIS mat) only:

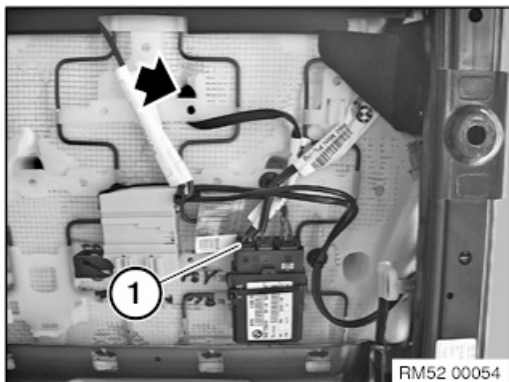
Cut open cable strap (1).

Raise the tab and pull connector (2) out through the side of the connector housing (3).

Installation note:

Replace cable tie (1).

Connector (2) is encoded against incorrect assembly.



Version with seat heating:

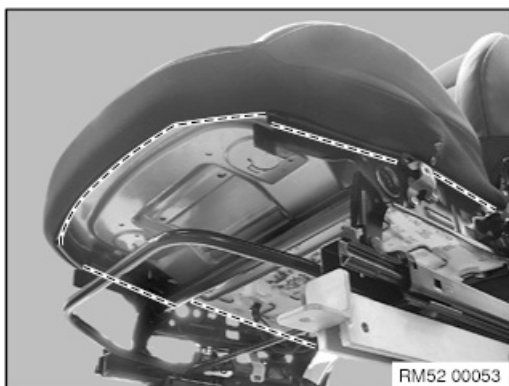
Unfasten plug connection (1) and disconnect.

Installation note:

Connector is coded against incorrect assembly.



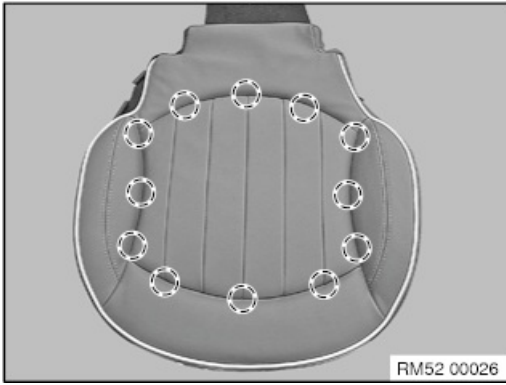
Lever out wirt in marked area.



Lever out wirt in marked area.

Remove padding with seat cover from seat mechanism.



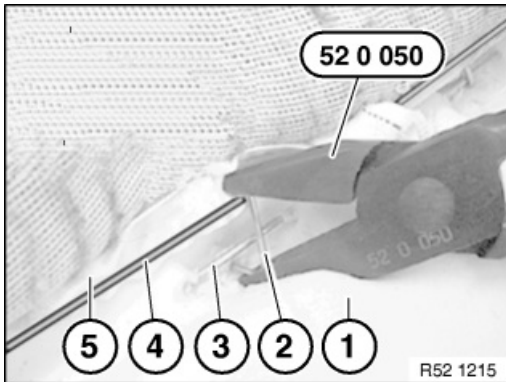


Release all clamps in marked area.

Remove seat cover from upholstery.

Important!

Remove all remnants of clamps from seat cover and upholstery.



Installation note:

Insert new clamp (2) with special tool 52 0 050 and bend closed.

1. Upholstery
2. Clamp
3. Trim wire in upholstery
4. OKE-strip in seat cover
5. Seat cover



Enabling seat occupancy detector (CIS mat):

- Connect BMW programming system
- Encode airbag control unit
- Delete fault memory if necessary



**Special tools required:**

- 52 0 050

**Necessary preliminary tasks:**

- Remove front seat
- Remove inner cover
- Remove outer cover
- Remove seat belt tensioner

**Only US version / Canadian version front passenger seat (with seat occupancy mat):**Faulty seat cover:

The seat cover, facing and seat occupancy mat must be completely replaced.

The new seat cover is supplied with facing, seat occupancy mat and if applicable seat heating.

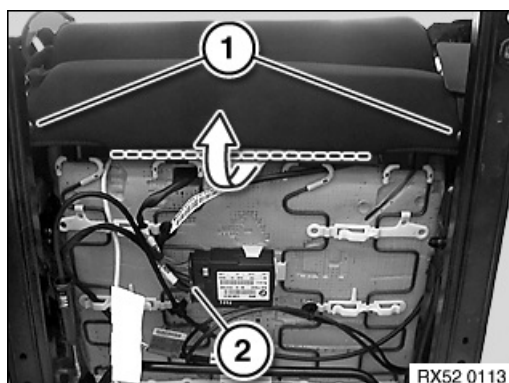
Faulty seat occupancy mat or facing:

Both parts can only be replaced together.

After installation, the seat occupancy mat must be enabled with the BMW programming system.

Enabling the seat occupancy detection (seat occupancy mat):

- Connect BMW programming system
- Encode airbag control unit
- Delete fault memory if necessary

Version with seat heating:

Unfasten plug connection (2) and disconnect.

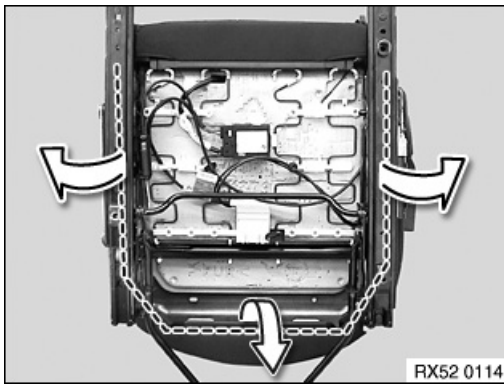
Installation note:

Connector is coded against incorrect assembly.

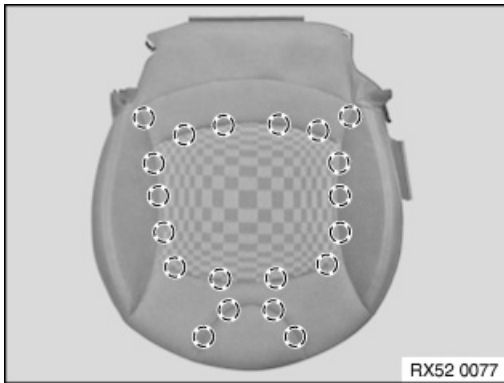
Lift out clips (1).

Take out the welt from seat mechanism in the marked area.





Take out the welt from seat mechanism in the marked area.
Remove padding with seat cover from seat mechanism.



For version with seat occupancy mat:

- The seat occupancy mat must not be kinked under any circumstances.

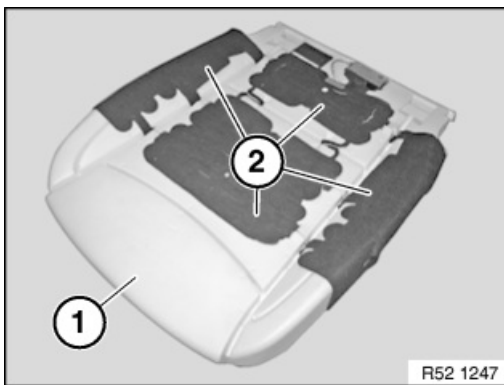
Detach all clamps in side area from longitudinal wires.

Depending on the version, if required, carefully fold back seat cover and release clamps from cross-wires.

Remove seat cover from upholstery.

Attention!

Remove all remnants of clamps from seat cover and upholstery.



Facing (1) with seat occupancy mat (2). **Attention!**

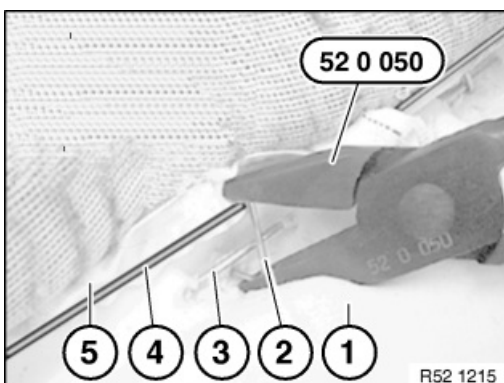
No clamp remainders may be fitted as well.

Handle the seat occupancy mat with extreme care.

Do not kink the seat occupancy mat.

Do not clamp the seat occupancy mat.

The seat occupancy mat must lie without folds under seat cover.



Installation note:

Insert new clamp (2) with special tool 52 0 050 and bend closed.

1. Upholstery
2. Clamp
3. Trim wire in upholstery
4. Trim wire in seat cover
5. Seat cover



65 77 604 Replacing sensor mat (CIS mat) for front passenger seat occupancy detector



Warning!

Note airbag safety regulations!

Incorrect handling can activate airbag and cause injury.



Warning!

Only US and Canadian version of front passenger seat (with CIS mat):

The CIS mat is bonded to the entire surface of the facing and can only be removed in conjunction with the padding from the seat cover.

If CIS mat or padding is defective, both parts may only be replaced together.

Full functional capability can only be guaranteed with original BMW spare parts.

After installation, the CIS mat must be enabled with the BMW programming system.

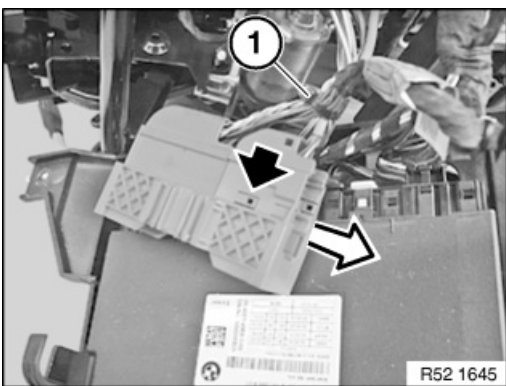


Procedure for replacing the CIS mat together with the upholstery is described in:

- Remove seat cover for front seat



The work scope with CIS mat is different for the following work steps:



Cut open cable strap (1).

Installation note:

Replace defective cable strap.

Raise tab and pull connector from connector housing.



Enabling seat occupancy detector (CIS mat):

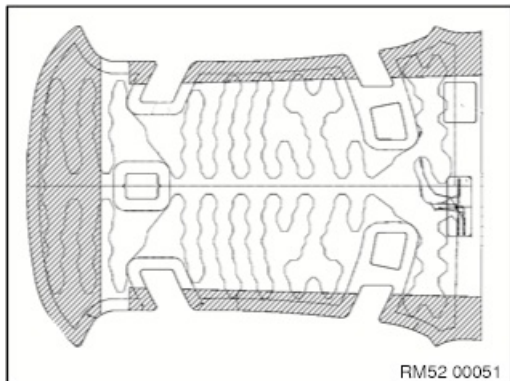
- Connect BMW programming system
- Code airbag control unit
- Delete fault memory if necessary





Necessary preliminary work:

- Detach seat cover from padding



Note:

Heating element is partially bonded to foam part and they can be separated from each other without incurring damaged if handled carefully.

Carefully pull off heating element in marked area from foam part.

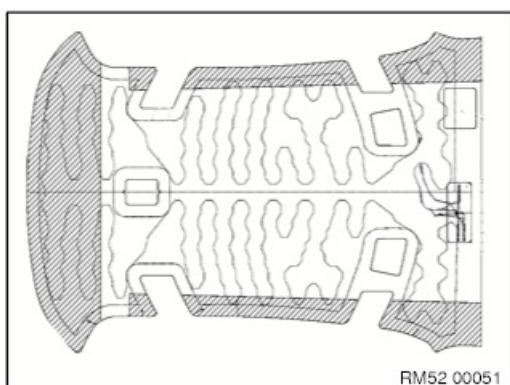


Check foam part:

- No obvious damage or material defects
- No bubbles in foam part
- No dirt contamination on foam part or residual foam

Check heating mat:

- No obvious damage or material defects
- All tear-off film pieces presents
- Note version by examining label on cable



Installation note:

Guide cable for backrest heating through foam hole.

Stick on heating element:

- Pull off adhesive film from heating element and stick onto edge of foam part until flush
- Press down evenly in outwards direction



Check routing of heating element for:

- Heating element laid without folds
- Heating element correctly positioned
- All bonding surfaces stuck on

Note:

Carry out functional check.







The operation for removing the upholstery is described in:

- Replacing seat cover for driver's seat



**Warning!**

Only US and Canadian version of front passenger seat (with CIS mat):

The CIS mat can only be removed in conjunction with the padding from the seat cover.

If CIS mat or padding is defective, both parts may only be replaced together.

Full functional capability can only be guaranteed with original BMW spare parts.

After fitting the seat cover, the CIS mat must be enabled with the BMW programming system.

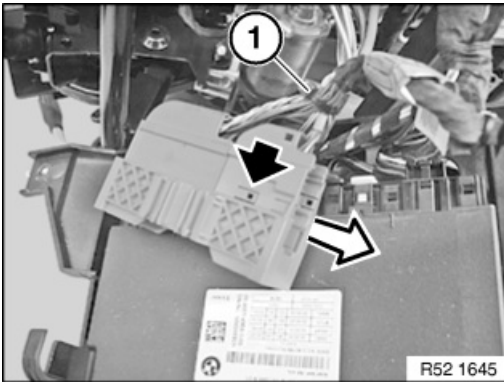


The operation for removing the upholstery is described in:

- Replacing seat cover for front passenger seat



The work scope with CIS mat is different for the following work steps:



Cut open cable strap (1).

Lift locking tab and pull the connector out of the side of the connector housing.

Installation note:

Replace cable tie (1).

Connector is encoded against incorrect assembly.



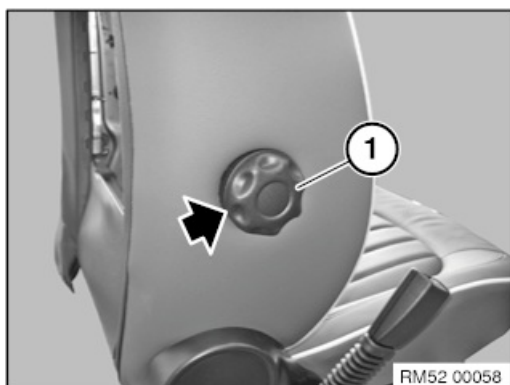
Enabling seat occupancy detector (CIS mat):

- Connect BMW programming system
- Encode airbag control unit
- Delete fault memory if necessary

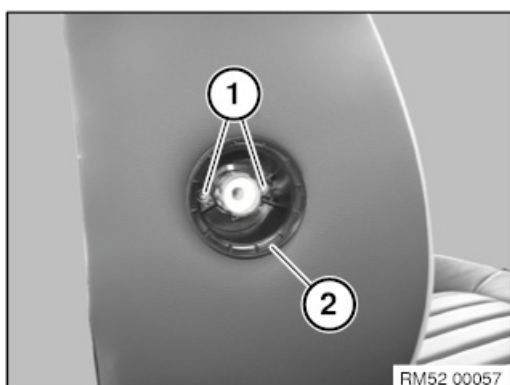


**Necessary preliminary work:**

- Turn the lumbar support hand wheel so that the least possible lumbar support results.
- Remove rear panel on front seat backrest
- Partially remove backrest cover

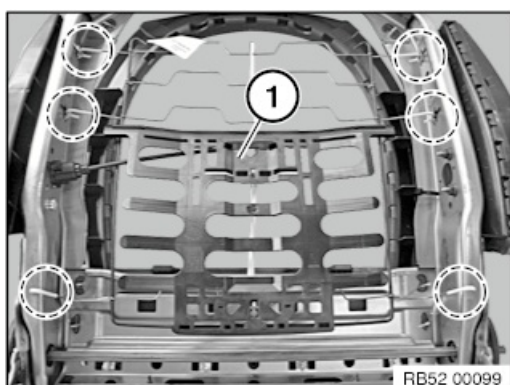


Lever out cover (1) with plastic wedge



Release screws (1).

Remove insert (2) for handwheel.



Disengage the spring wire from backrest frame.

Remove the lumbar support (1) with spring wire.

Installation note:

Run a function check.



52 13 198 Remove/fit/replace the rear wall at the front seat backrest on the left and right (up to 09/09)



Warning!

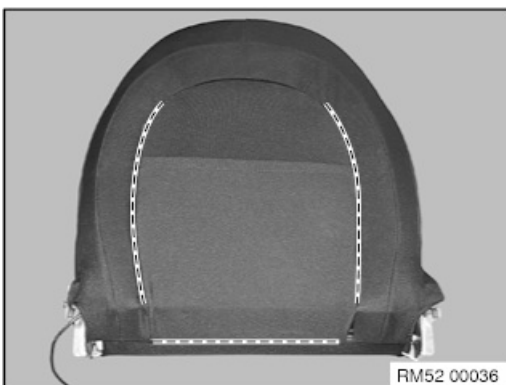
Seat and backrest frame of front seats have very sharp edges.
Danger of injury and damage!



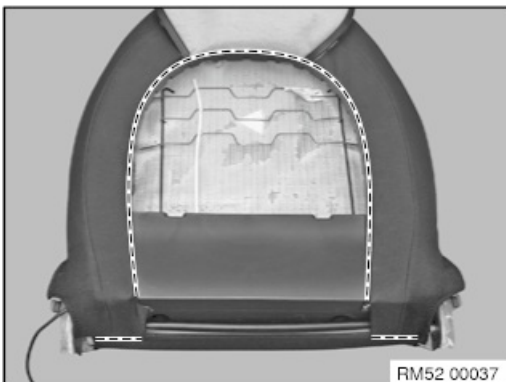
Warning!

Observe safety regulations when handling airbag modules.
Incorrect handling can activate airbag and cause injury.

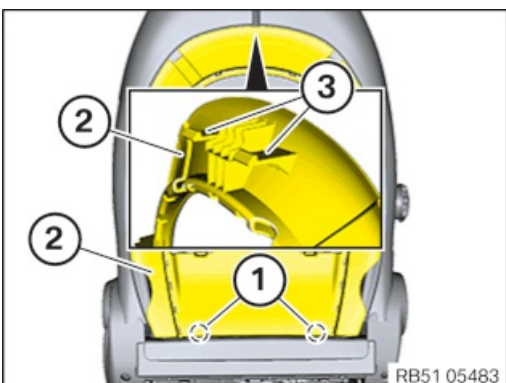
Switch off the ignition!



Lever out welt in marked area of rear panel.



Lever out welt in marked area of rear panel.



Loosen screws (1).

Detach rear panel (2) on the retaining lugs (3) and feed out downwards.



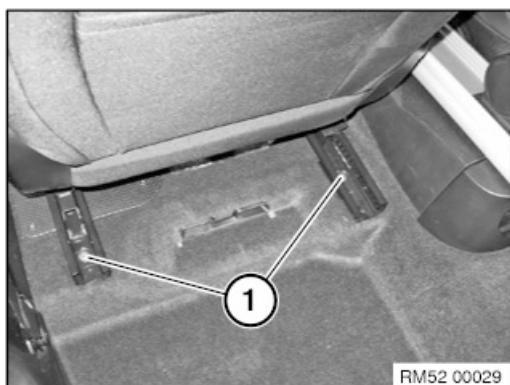
**Warning!**

Observe safety regulations for handling airbag modules and pyrotechnical seat belt tensioners.

Incorrect handling may trigger off pyrotechnical belt tensioners or the side airbag, which may result in injury.

**Necessary preliminary work:**

- Switch off ignition
- Disconnect battery earth lead



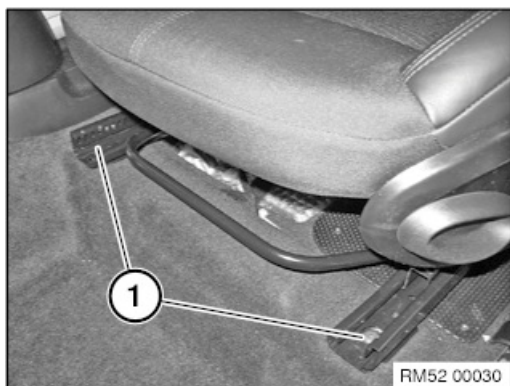
Slide front forward as far as it will go.

Release screws (1).

Installation note:

Replace screws.

Tightening torque 52 13 1AZ.



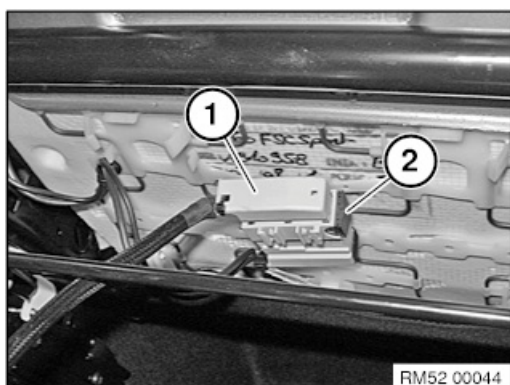
Slide front seat back as far as it will go.

Release screws (1).

Installation note:

Replace screws.

Tightening torque 52 13 1AZ.



Unlock plug connections (2) and disconnect connector (1).





Important!

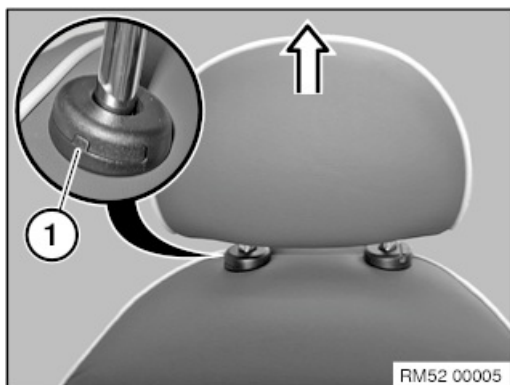
Cover entrance for protection purposes (risk of damage).

Lift out front seat.



52 13 390 restraint

Removing and installing or replacing front left or right head

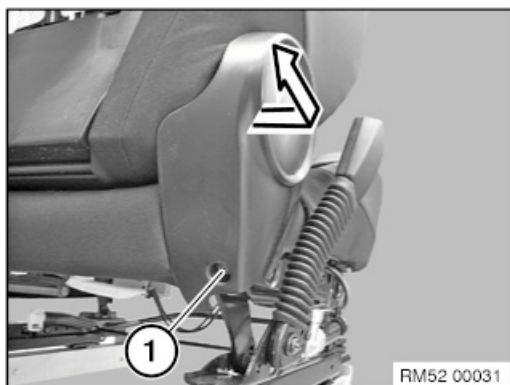


Move complete head restraint up as far as possible.
Press release (1) and pull out head restraint.



52 13 041 front seat

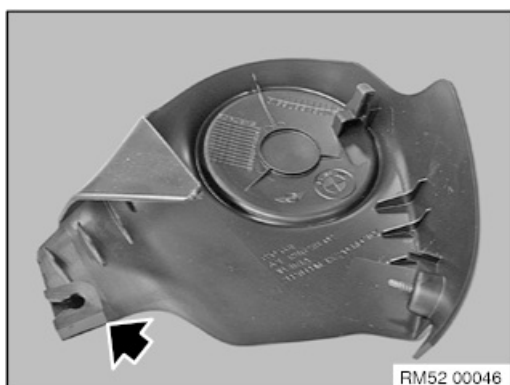
Removing and installing or replacing inner cover on left or right



Release screw (1).

Tightening torque 52 13 09AZ.

Remove cover in direction of arrow.



Installation note:

Make sure the cover is correctly seated on the seat mechanism.

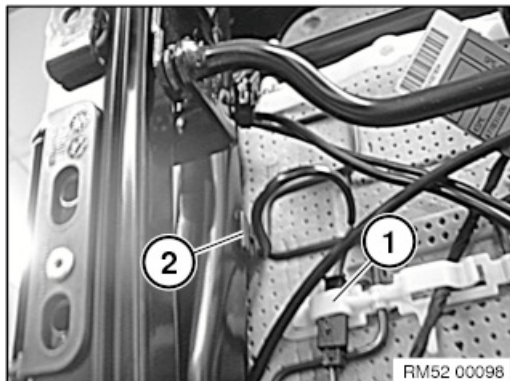


52 13 ... Removing and installing position switch

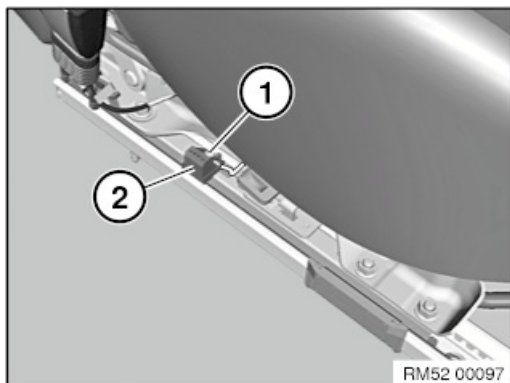


Necessary preliminary tasks:

- Remove front seat



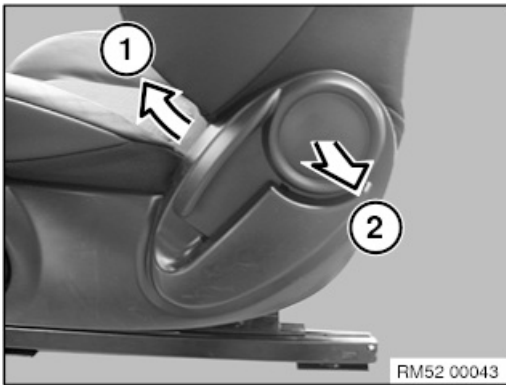
Unfasten plug connection (1) and disconnect.
Pull the metal clamp (2) off the seat mechanism.



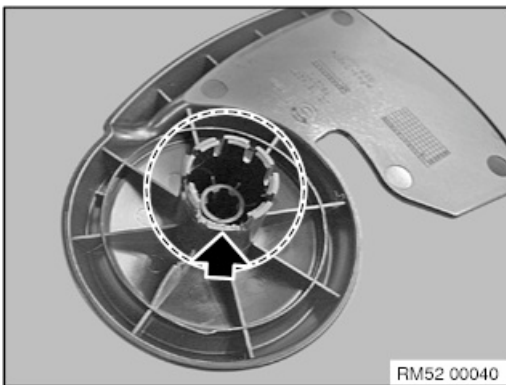
Release screw (1).
Remove position switch (2).



52 13 031 Removing and installing/replacing backrest adjustment lever on left or right front seat



1. Pull up lever upwards.
2. Firmly unclip lever from linkage.



Installation note:

The latch mechanism of the lever must not be damaged.
Replace lever if necessary.

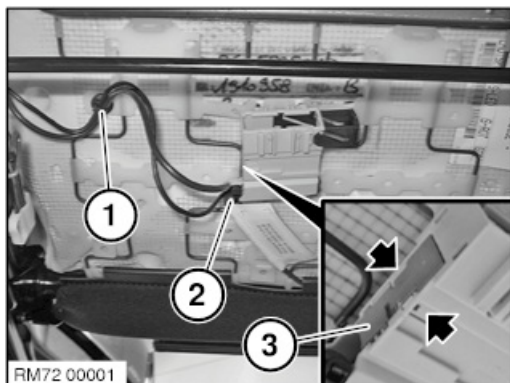


**Necessary preliminary work:**

- Remove front seat
- Remove outer cover
- Remove inner cover

*Installation note:*

- Microencapsulated screws (Loctite) must be replaced and may not be reused
- Screw connection must be completed within 20 minutes (start of hardening)
- Microencapsulated screws must not be retightened
- Clean thread of nut beforehand in event of repeated use



Detach cable straps (1) on clip.

Detach cable straps (2) on connector housing.

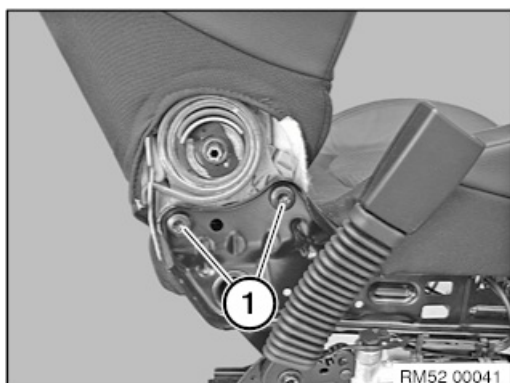
Unlock connector (3) and pull out of connector housing.

Feed wiring harness of airbag module out of seat mechanism.

Installation note:

Connector is coded against incorrect assembly.

Replace faulty cable straps.



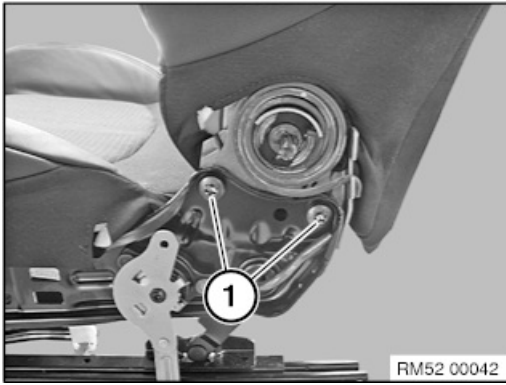
Release screws (1).

Tightening torque 52 13 03AZ.

Installation note:

Replace microencapsulated screws.





Release screws (1).

Tightening torque 52 13 03AZ.

Installation note:

Replace microencapsulated screws.

Remove backrest frame from seat mechanism.



Replacement only:

If necessary, remove lumbar support.

Remove backrest cover.

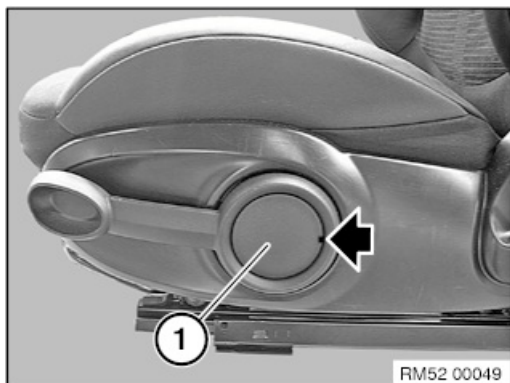
Remove side airbag.



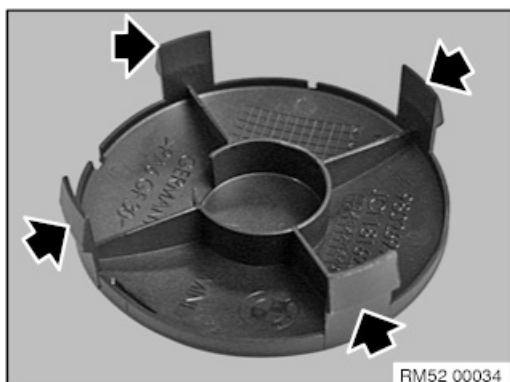


Necessary preliminary work:

- Remove lever for backrest adjustment on front seat



Unclip cover (1).



Installation note:

Retaining lugs must not be damaged.

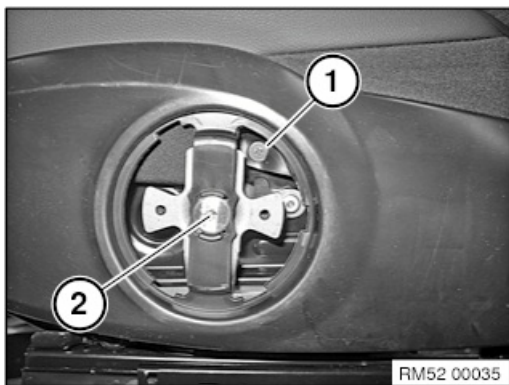
If necessary, replace faulty cover.



Release screws (1).

Tightening torque 52 13 08AZ.





Release screw (1).

Tightening torque 52 13 09AZ.

Release screw (2).

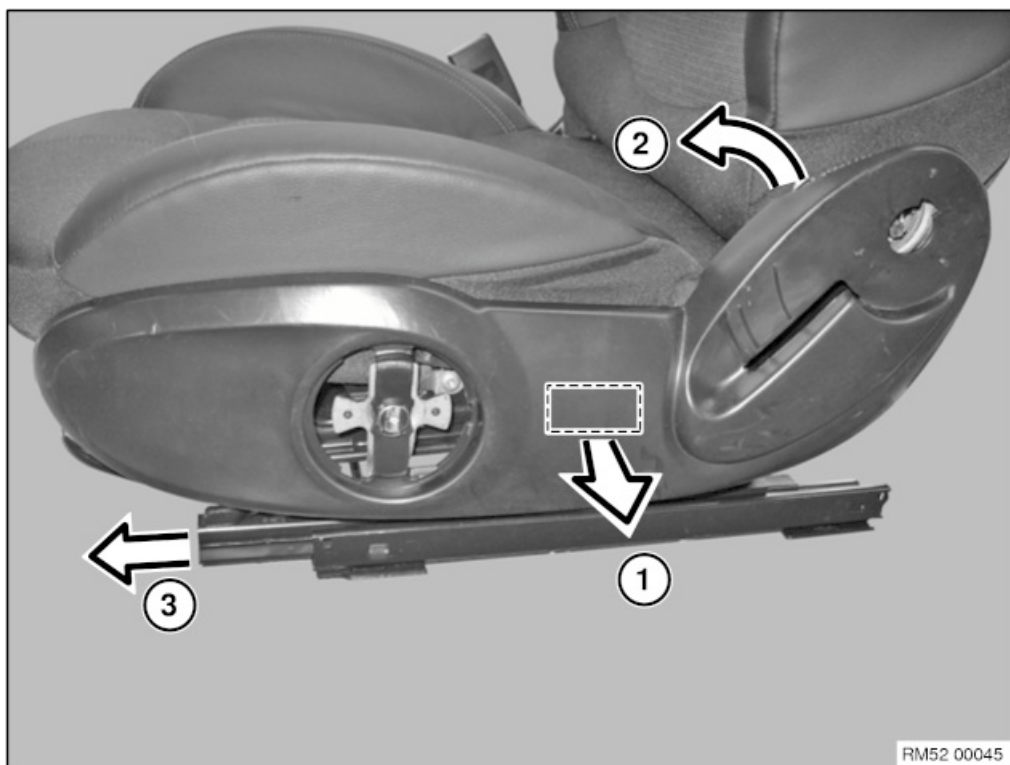
Installation note:

Insert screw (2) with Loctite.



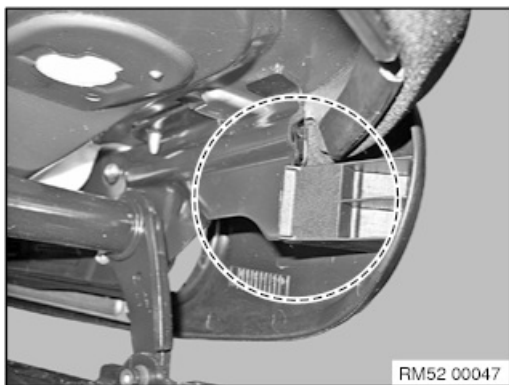
Release screw (1).

Tightening torque 52 13 09AZ.



1. Unclip cover in marked area.
2. Swing cover upwards to disengage tab of seat mechanism.
3. Remove cover towards front.





Installation note:

First apply the front cover to the seat mechanism.

Make sure cover is correct seated on the seat mechanism (marked area).



52 26 045 Removing and installing/replacing seat frame for left or right rear seat (4-seater)



Necessary preliminary tasks:

- Remove backrest



Replacement only:

- Remove seat cover
- Remove the lower strap



52 26 039
(5-seater)

Removing and installing/replacing seat frame for rear seat, right



Necessary preliminary tasks:

- Remove backrest



Replacement only:

- Remove seat cover
- Remove the lower strap



52 13 020 seat

Removing and installing/replacing seat frame on left or right front



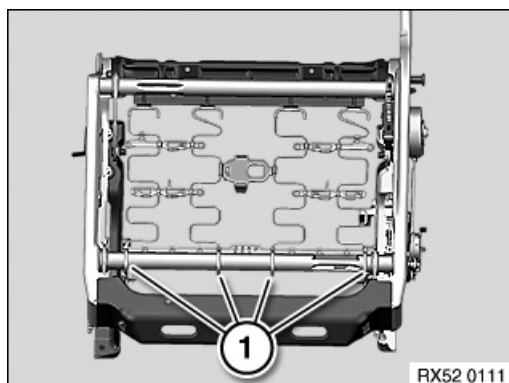
Necessary preliminary work:

- Remove seat cover



Replacement only:

- Remove seat belt tensioner



If necessary, disengage springs (1) from seat frame.



**Special tools required:**

- 52 0 050

**Necessary preliminary work:**

- Remove backrest
- Remove head restraint

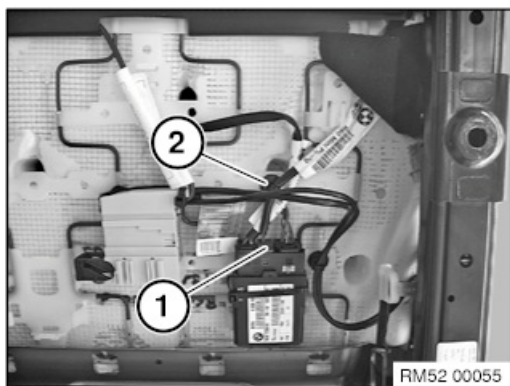
**Warning!**

Seat and backrest frame of front seats have very sharp edges.
Danger of injury and damage!

**Warning!**

Observe safety regulations when handling airbag modules.
Incorrect handling can lead to airbag deployment and cause injury.

Switch off the ignition!

Version with seat heating:

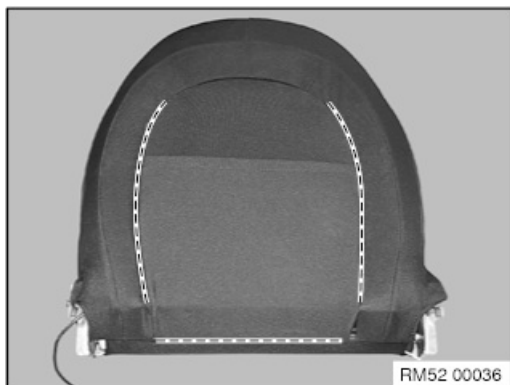
Unfasten plug connection (1) and disconnect.

Cut open cable strap (2).

Installation note:

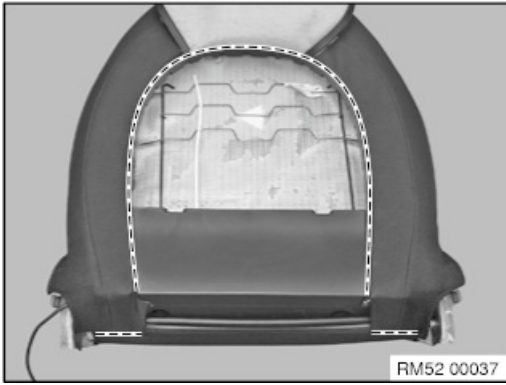
Connector is coded against incorrect assembly.

Replace defective cable strap.

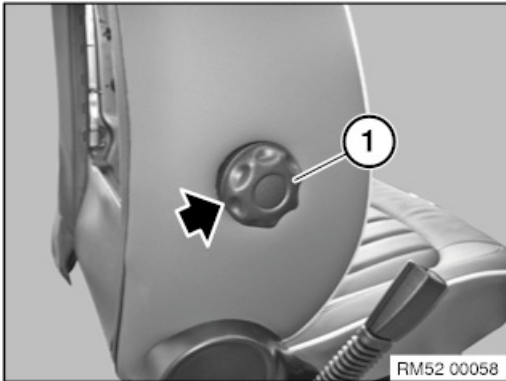


Lever out welt in marked area of rear panel.

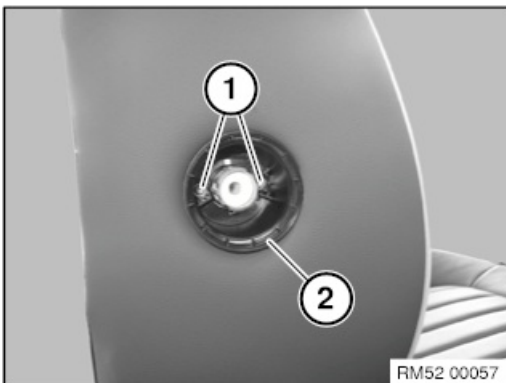




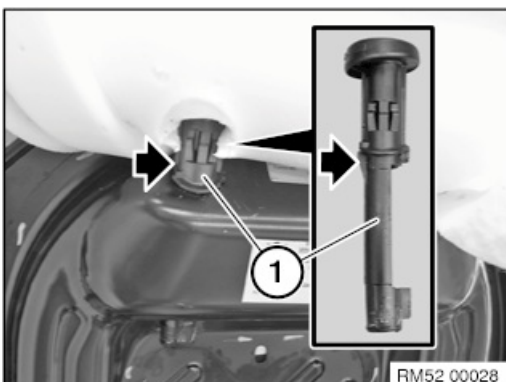
Lever out welt in marked area of rear panel.



Lever out cover (1) with plastic wedge

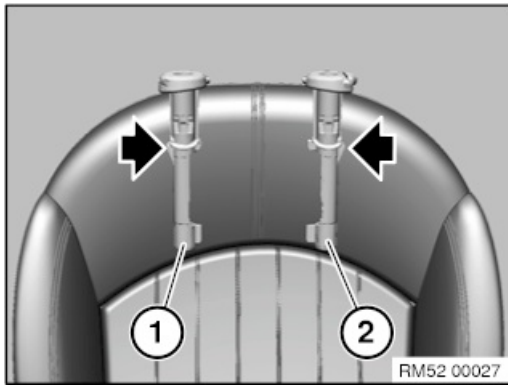


Release screws (1).
Remove insert (2) for handwheel.



Fold the backrest cover upwards to expose the working area.
Press in retaining lug and remove guide sleeve upwards.
Remove backrest cover with upholstery from backrest frame.





Installation note:

Retaining lugs must point outwards.

1. Guide sleeve without button
2. Guide sleeve with button

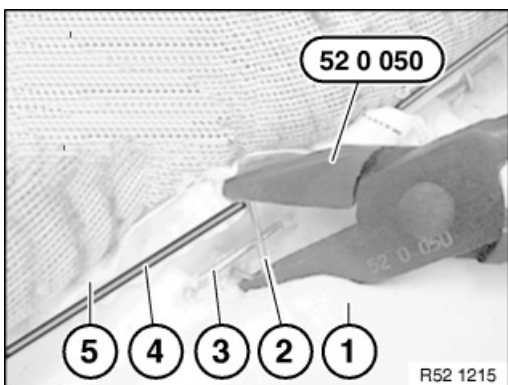


Release all clamps in marked area.

Remove seat cover from upholstery.

Important!

Remove all remnants of clamps from seat cover and upholstery.



Installation note:

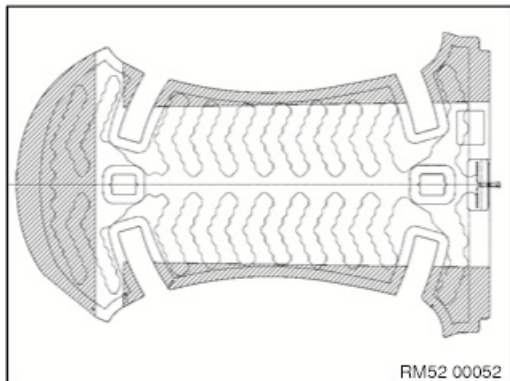
Insert new clamp (2) with special tool 52 0 050 and bend closed.

1. Upholstery
2. Clamp
3. Trim wire in upholstery
4. OKE strip in backrest cover
5. Backrest cover



**Necessary preliminary work:**

- Detach backrest cover from padding

*Note:*

Heating element is partially bonded to foam part and they can be separated from each other without incurring damaged if handled carefully.

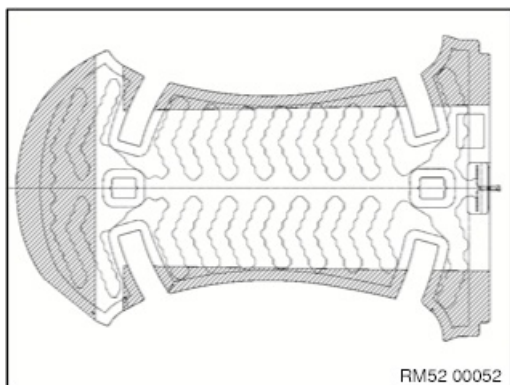
Carefully pull off heating element in marked area from foam part.

Check foam part:

- No obvious damage or material defects
- No bubbles in foam part
- No dirt contamination on foam part or residual foam

Check heating mat:

- No obvious damage or material defects
- All tear-off film pieces presents
- Note version by examining label on cable

*Installation note:*

Guide cable for backrest heating through foam hole.

Stick on heating element:

- Pull off adhesive film from heating element and stick onto edge of foam part until flush
- Press down evenly in outwards direction

Check routing of heating element for:

- Heating element laid without folds
- Heating element correctly positioned
- All bonding surfaces stuck on

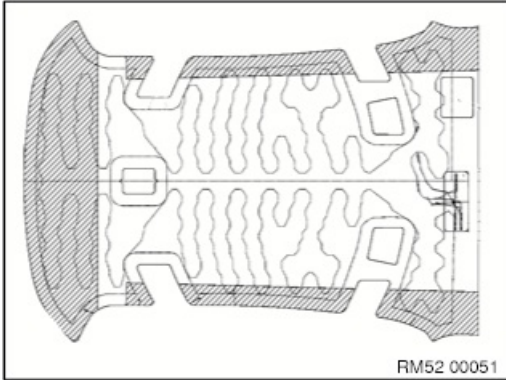
Note:

Carry out functional check.



**Necessary preliminary work:**

- Detach seat cover from padding

*Note:*

Heating element is partially bonded to foam part and they can be separated from each other without incurring damaged if handled carefully.

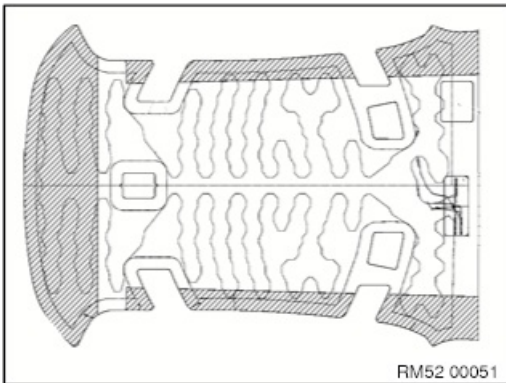
Carefully pull off heating element in marked area from foam part.

Check foam part:

- No obvious damage or material defects
- No bubbles in foam part
- No dirt contamination on foam part or residual foam

Check heating mat:

- No obvious damage or material defects
- All tear-off film pieces presents
- Note version by examining label on cable

*Installation note:*

Guide cable for backrest heating through foam hole.

Stick on heating element:

- Pull off adhesive films from heating element and stick onto edge of foam part until flush
- Press down evenly in outwards direction

Check routing of heating element for:

- Heating element laid without folds
- Heating element correctly positioned
- All bonding surfaces stuck on

Note:

Carry out functional check.





Only US version / Canadian version front passenger seat (with seat occupancy mat):

Faulty seat cover:

The seat cover, facing and seat occupancy mat must be completely replaced.

The new seat cover is supplied with facing, seat occupancy mat and if applicable seat heating.

Faulty seat occupancy mat or facing:

Both parts can only be replaced together.

After installation, the seat occupancy mat must be enabled with the BMW programming system.



The operation for removing the facing without seat occupancy mat is described in:

- Replacing seat cover on left or right front seat.



Enabling the seat occupancy detection (seat occupancy mat):

- Connect BMW programming system
- Encode airbag control unit
- Delete fault memory if necessary

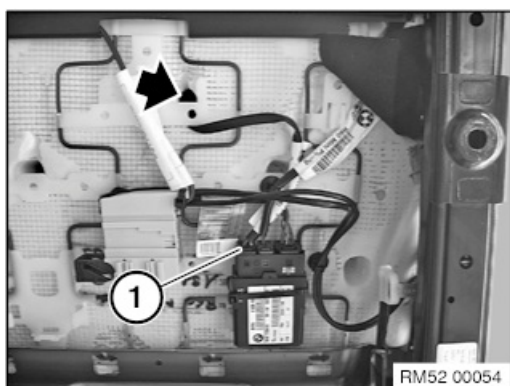


**Special tools required:**

- 52 0 050

**Necessary preliminary work:**

- Remove front seat
- Remove inner cover
- Remove outer cover
- Removing backrest frame

Version with seat heating:

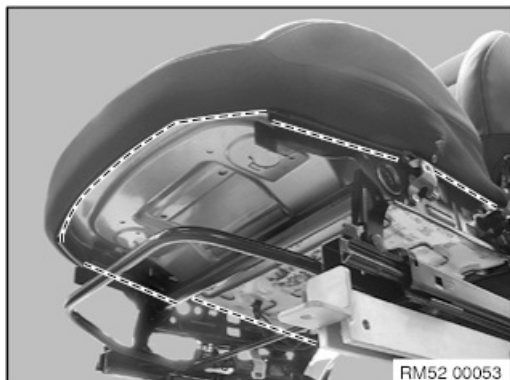
Unfasten plug connection (1) and disconnect.

Installation note:

Connector is coded against incorrect assembly.



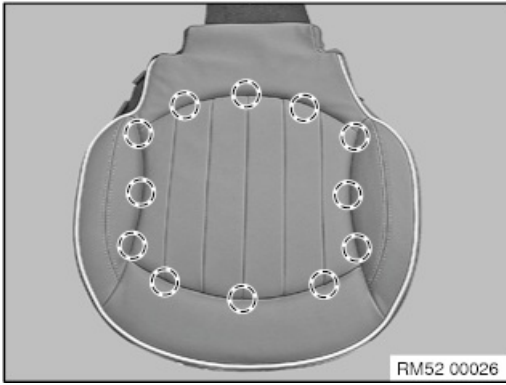
Lever out welt in marked area.



Lever out welt in marked area.

Remove padding with seat cover from seat mechanism.



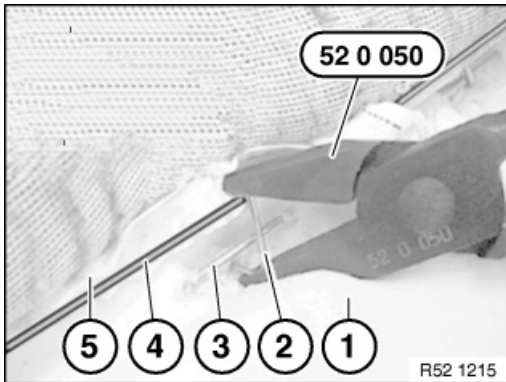


Release all clamps in marked area.

Remove seat cover from upholstery.

Important!

Remove all remnants of clamps from seat cover and upholstery.



Installation note:

Insert new clamp (2) with special tool 52 0 050 and bend closed.

1. Upholstery
2. Clamp
3. Trim wire in upholstery
4. OKE-strip in seat cover
5. Seat cover



**Special tools required:**

- 52 0 050

**Necessary preliminary tasks:**

- Remove front seat
- Remove inner cover
- Remove outer cover
- Removing backrest frame

**Warning!**

Only US and Canadian version of front passenger seat (with CIS mat):

A defective seat cover can be replaced separately from the upholstery and CIS mat.

A faulty CIS mat, seat heating or upholstery can only be replaced as a single unit.

New CIS mat is supplied with upholstery and if necessary seat heating.

Full functional capability can only be guaranteed with original BMW spare parts.

After fitting the seat cover, the CIS mat must be enabled with the BMW programming system.

**Warning!**

Only US and Canadian version of front passenger seat (with CIS mat):

To avoid damaging the CIS mat, it is essential to carry out the following operations with extra care.

**Important!**

Risk of damage on sharp-edged seat mechanism.

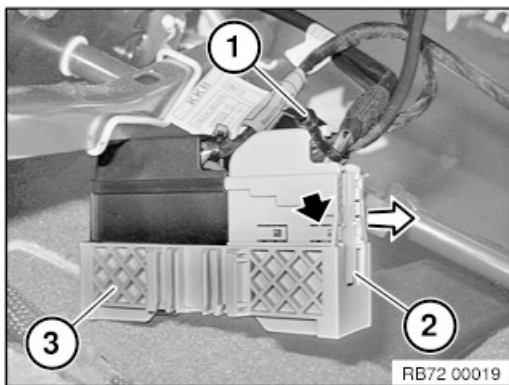
Guide all cables carefully through seat and backrest mechanism.

Make sure cable is routed without kinks and tension.

Make sure plug connections are correctly locked.

Make sure connectors are correctly seated in latch mechanisms.





Version with seat occupancy detection (CIS mat) only:

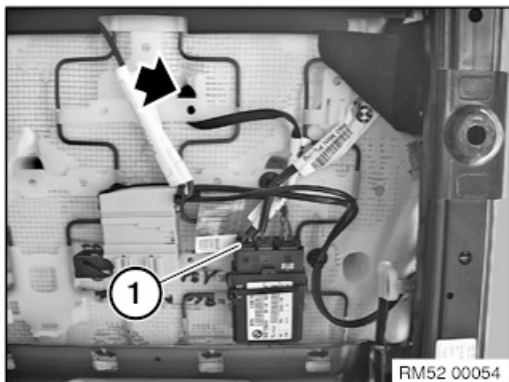
Cut open cable strap (1).

Raise the tab and pull connector (2) out through the side of the connector housing (3).

Installation note:

Replace cable tie (1).

Connector (2) is encoded against incorrect assembly.



Version with seat heating:

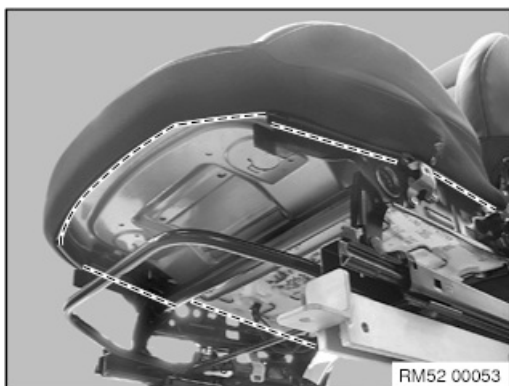
Unfasten plug connection (1) and disconnect.

Installation note:

Connector is coded against incorrect assembly.



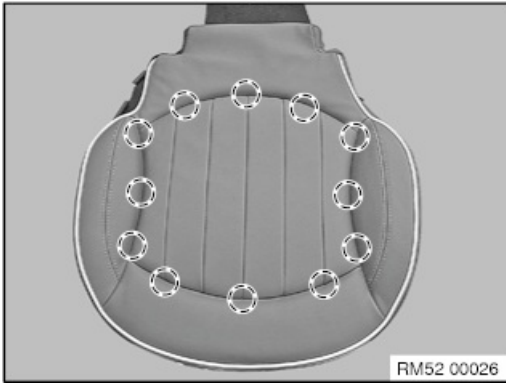
Lever out wirt in marked area.



Lever out wirt in marked area.

Remove padding with seat cover from seat mechanism.



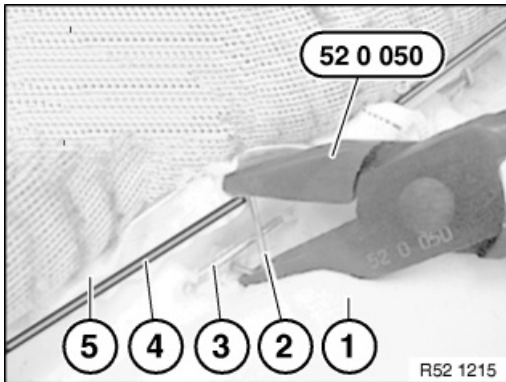


Release all clamps in marked area.

Remove seat cover from upholstery.

Important!

Remove all remnants of clamps from seat cover and upholstery.



Installation note:

Insert new clamp (2) with special tool 52 0 050 and bend closed.

1. Upholstery
2. Clamp
3. Trim wire in upholstery
4. OKE-strip in seat cover
5. Seat cover



Enabling seat occupancy detector (CIS mat):

- Connect BMW programming system
- Encode airbag control unit
- Delete fault memory if necessary



**Special tools required:**

- 52 0 050

**Necessary preliminary tasks:**

- Remove front seat
- Remove inner cover
- Remove outer cover
- Remove seat belt tensioner

**Only US version / Canadian version front passenger seat (with seat occupancy mat):**Faulty seat cover:

The seat cover, facing and seat occupancy mat must be completely replaced.

The new seat cover is supplied with facing, seat occupancy mat and if applicable seat heating.

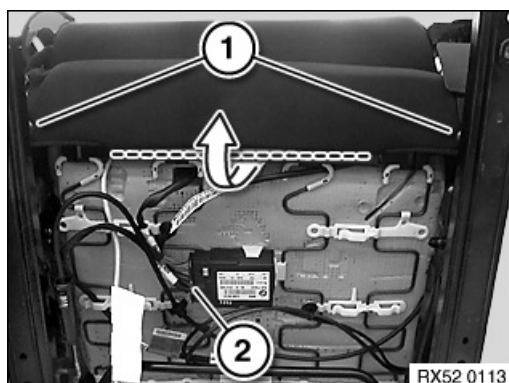
Faulty seat occupancy mat or facing:

Both parts can only be replaced together.

After installation, the seat occupancy mat must be enabled with the BMW programming system.

Enabling the seat occupancy detection (seat occupancy mat):

- Connect BMW programming system
- Encode airbag control unit
- Delete fault memory if necessary

Version with seat heating:

Unfasten plug connection (2) and disconnect.

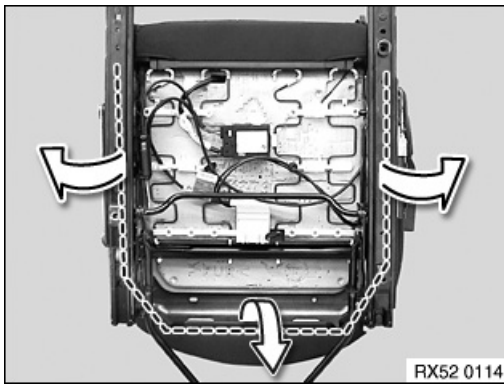
Installation note:

Connector is coded against incorrect assembly.

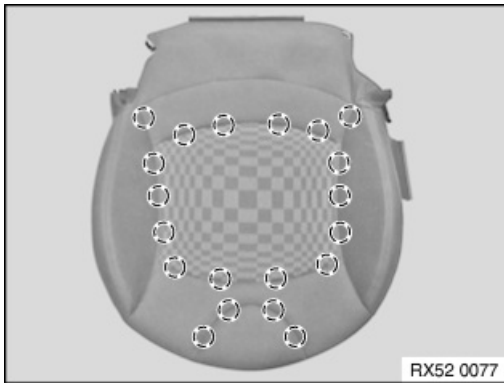
Lift out clips (1).

Take out the welt from seat mechanism in the marked area.





Take out the welt from seat mechanism in the marked area.
Remove padding with seat cover from seat mechanism.



For version with seat occupancy mat:

- The seat occupancy mat must not be kinked under any circumstances.

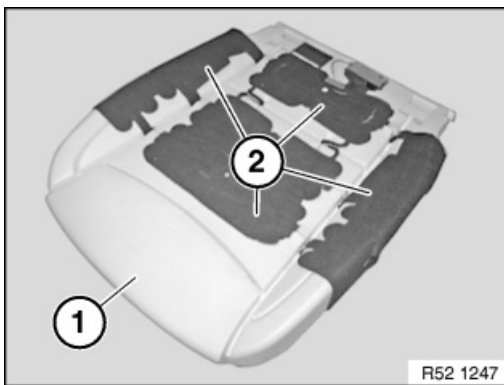
Detach all clamps in side area from longitudinal wires.

Depending on the version, if required, carefully fold back seat cover and release clamps from cross-wires.

Remove seat cover from upholstery.

Attention!

Remove all remnants of clamps from seat cover and upholstery.



Facing (1) with seat occupancy mat (2). **Attention!**

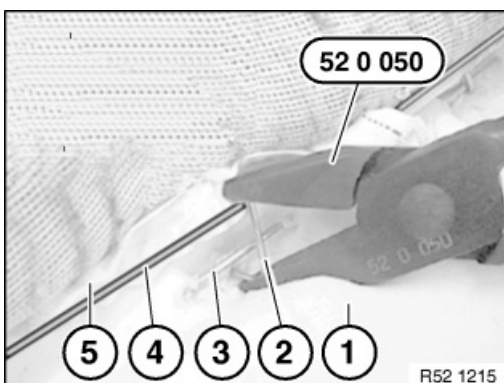
No clamp remainders may be fitted as well.

Handle the seat occupancy mat with extreme care.

Do not kink the seat occupancy mat.

Do not clamp the seat occupancy mat.

The seat occupancy mat must lie without folds under seat cover.



Installation note:

Insert new clamp (2) with special tool 52 0 050 and bend closed.

1. Upholstery
2. Clamp
3. Trim wire in upholstery
4. Trim wire in seat cover
5. Seat cover



65 77 604 Replacing sensor mat (CIS mat) for front passenger seat occupancy detector



Warning!

Note airbag safety regulations!

Incorrect handling can activate airbag and cause injury.



Warning!

Only US and Canadian version of front passenger seat (with CIS mat):

The CIS mat is bonded to the entire surface of the facing and can only be removed in conjunction with the padding from the seat cover.

If CIS mat or padding is defective, both parts may only be replaced together.

Full functional capability can only be guaranteed with original BMW spare parts.

After installation, the CIS mat must be enabled with the BMW programming system.

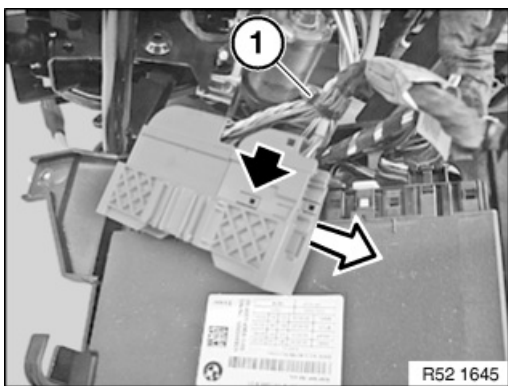


Procedure for replacing the CIS mat together with the upholstery is described in:

- Remove seat cover for front seat



The work scope with CIS mat is different for the following work steps:



Cut open cable strap (1).

Installation note:

Replace defective cable strap.

Raise tab and pull connector from connector housing.



Enabling seat occupancy detector (CIS mat):

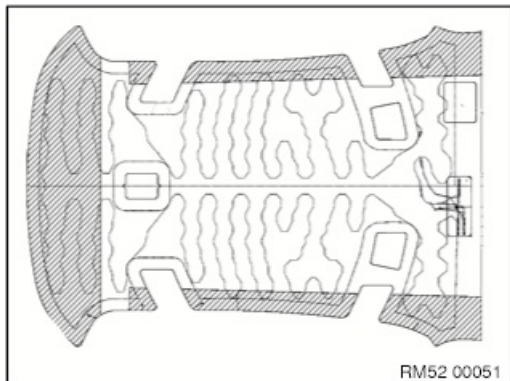
- Connect BMW programming system
- Code airbag control unit
- Delete fault memory if necessary





Necessary preliminary work:

- Detach seat cover from padding



Note:

Heating element is partially bonded to foam part and they can be separated from each other without incurring damaged if handled carefully.

Carefully pull off heating element in marked area from foam part.

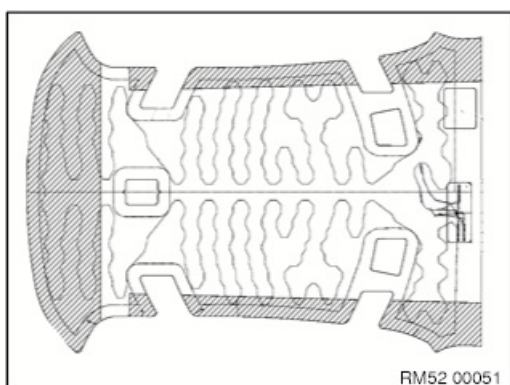


Check foam part:

- No obvious damage or material defects
- No bubbles in foam part
- No dirt contamination on foam part or residual foam

Check heating mat:

- No obvious damage or material defects
- All tear-off film pieces presents
- Note version by examining label on cable



Installation note:

Guide cable for backrest heating through foam hole.

Stick on heating element:

- Pull off adhesive film from heating element and stick onto edge of foam part until flush
- Press down evenly in outwards direction



Check routing of heating element for:

- Heating element laid without folds
- Heating element correctly positioned
- All bonding surfaces stuck on

Note:

Carry out functional check.







The operation for removing the upholstery is described in:

- Replacing seat cover for driver's seat



**Warning!**

Only US and Canadian version of front passenger seat (with CIS mat):

The CIS mat can only be removed in conjunction with the padding from the seat cover.

If CIS mat or padding is defective, both parts may only be replaced together.

Full functional capability can only be guaranteed with original BMW spare parts.

After fitting the seat cover, the CIS mat must be enabled with the BMW programming system.

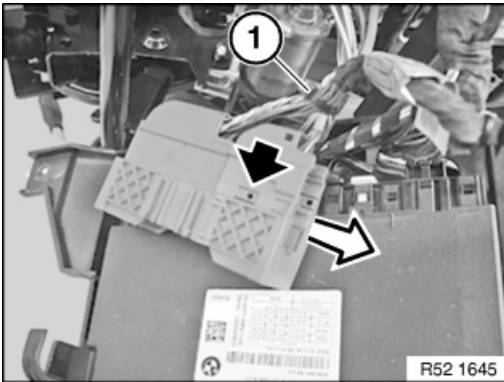


The operation for removing the upholstery is described in:

- Replacing seat cover for front passenger seat



The work scope with CIS mat is different for the following work steps:



Cut open cable strap (1).

Lift locking tab and pull the connector out of the side of the connector housing.

Installation note:

Replace cable tie (1).

Connector is encoded against incorrect assembly.



Enabling seat occupancy detector (CIS mat):

- Connect BMW programming system
- Encode airbag control unit
- Delete fault memory if necessary

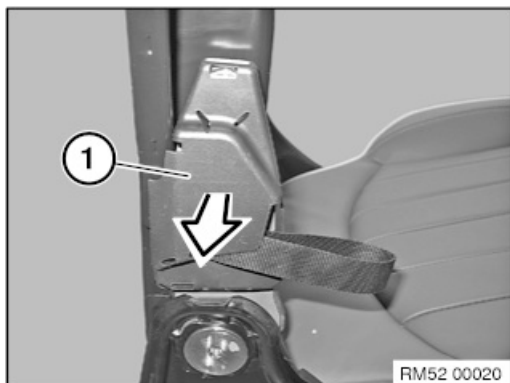


**Necessary preliminary tasks:**

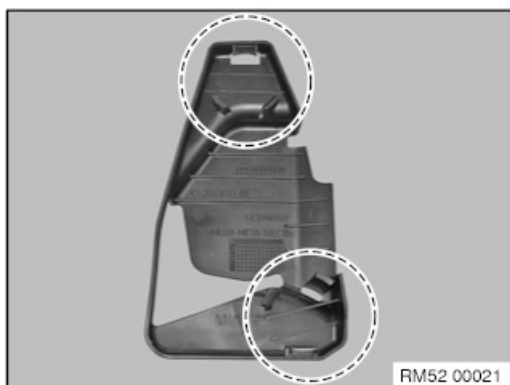
- Remove rear seat
- Partially remove the backrest cover in the lower area

*Installation note:*

- Microencapsulated screws must be replaced and may not be reused.
- Screw connection must be completed within 20 minutes (start of hardening).
- Microencapsulated screws must not be retightened.
- Clean thread of nut beforehand in event of repeated use.



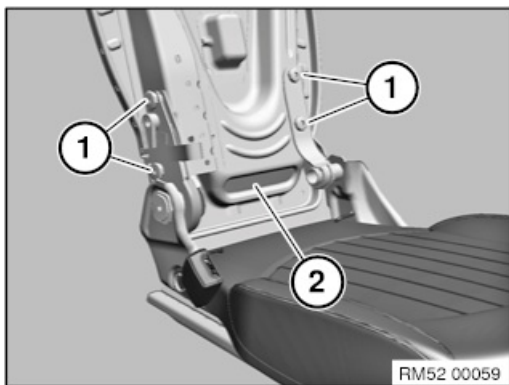
Unclip cover (1) for unlocking.

*Installation note:*

Retaining lugs must not be damaged.

If necessary, replace cover for unlocking.





Release screws (1).

Tightening torque 52 26 12AZ.

Remove backrest (2) from seat frame.

Installation note:

Replace screws (1).



Replacement only:

- Remove complete backrest cover
- Remove rear panel

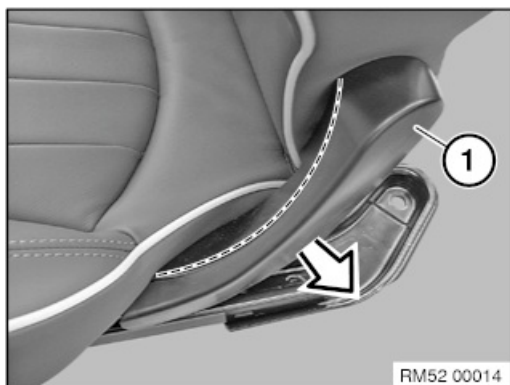


**Special tools required:**

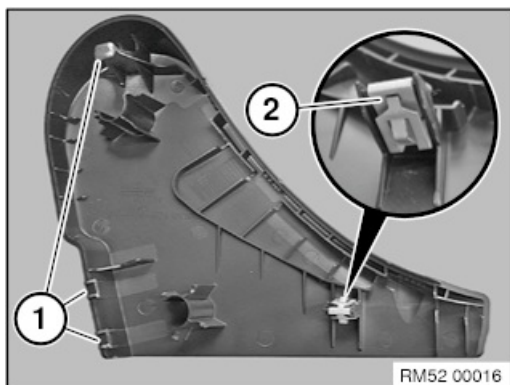
- 52 0 050

**Necessary preliminary work:**

- Remove rear seat



Unclip outer fitting cover (1).

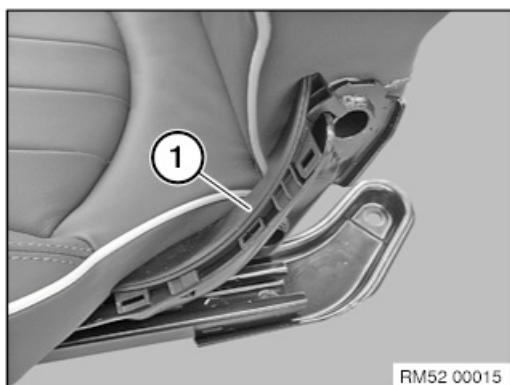
*Installation note:*

Retaining lugs (1) must not be damaged.

Metal clamp (2) must not be damaged.

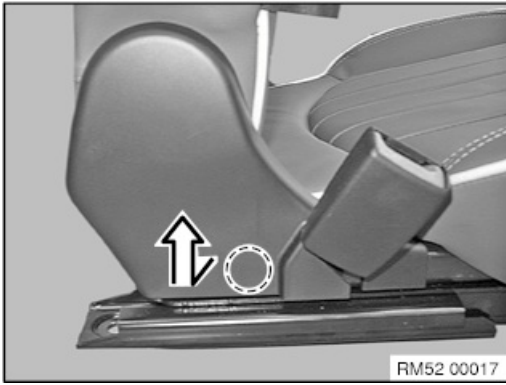
Pre-mount metal clamp (2) on fitting cover.

If necessary, replace faulty fitting cover or metal clamp.

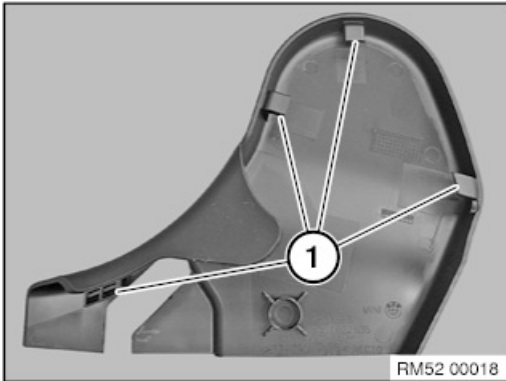


Remove the counterpart of the outer fitting cover (1).

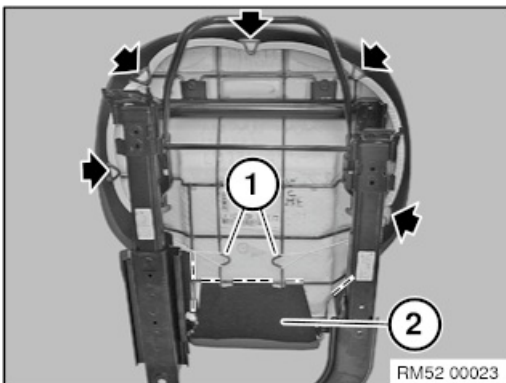




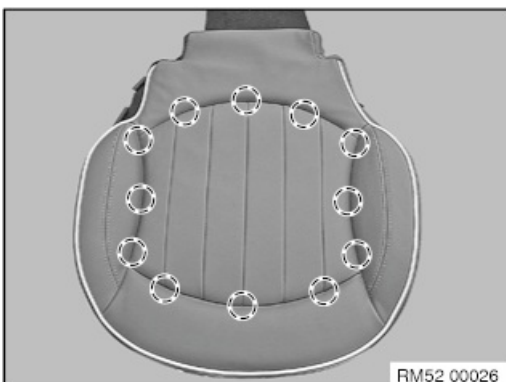
Unclip the inner fitting cover in marked area and remove.
Remove inner fitting cover in direction of arrow.



Installation note:
Retaining lugs (1) must not be damaged.
If necessary, replace faulty fitting cover.



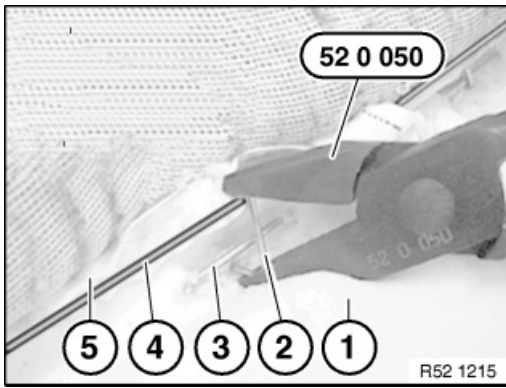
Detach the welt of the cover latch (2) in the marked area from the seat frame.
Detach the tensioning strap (1) from the seat frame.
Disengage seat cover in marked area from seat frame.



Detaching cover and upholstery:

- Disconnect all clamps in marked area
- Remove seat cover from padding
- Remove all remnants of retainers from cover and padding





Installation note:

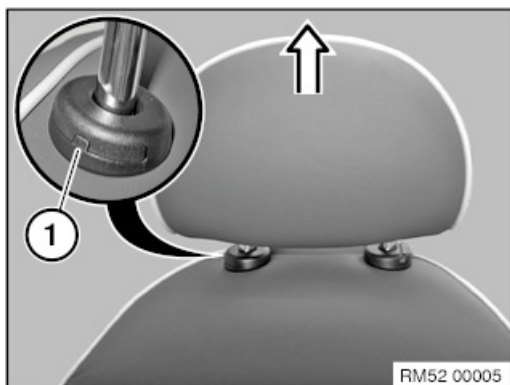
Insert new clamp (2) with special tool 52 0 050 and bend closed.

1. Upholstery
2. Clamp
3. Trim wire in upholstery
4. OKE-strip in seat cover
5. Seat cover



52 26 210 restraint

Removing and installing or replacing left or right rear head



Move complete head restraint up as far as possible.
Press release (1) and pull out head restraint.



52 26 015 Removing and installing/replacing backrest for left or right rear seat (4-seater)



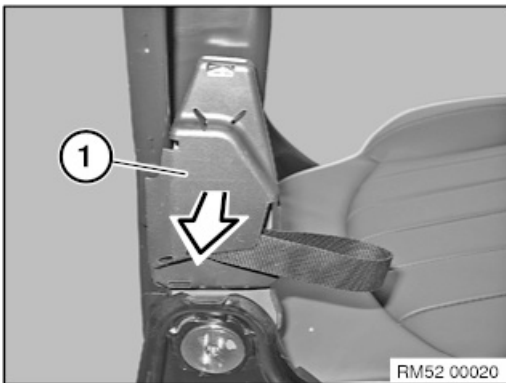
Necessary preliminary tasks:

- Remove rear seat
- Partially remove the backrest cover in the lower area

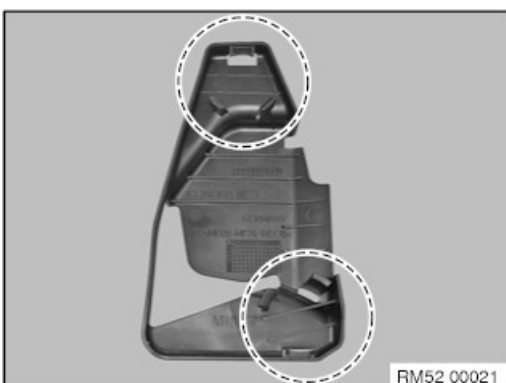


Installation note:

- Microencapsulated screws must be replaced and may not be reused.
- Screw connection must be completed within 20 minutes (start of hardening).
- Microencapsulated screws must not be retightened.
- Clean thread of nut beforehand in event of repeated use.



Unclip cover (1) for unlocking.

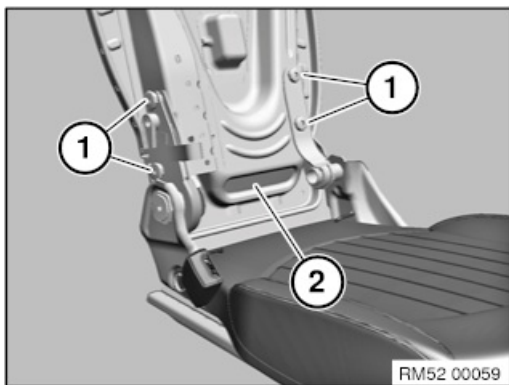


Installation note:

Retaining lugs must not be damaged.

If necessary, replace cover for unlocking.





Release screws (1).

Tightening torque 52 26 12AZ.

Remove backrest (2) from seat frame.

Installation note:

Replace screws (1).



Replacement only:

- Remove complete backrest cover
- Remove rear panel





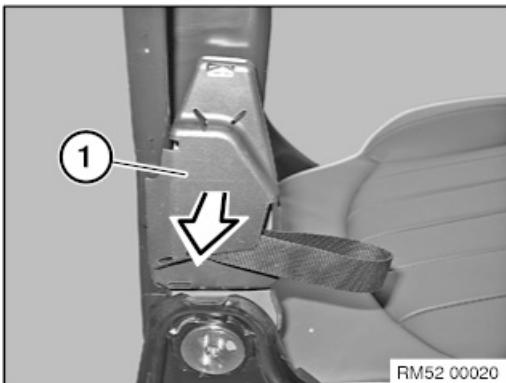
Necessary preliminary tasks:

- Remove rear seat
- Partially remove the backrest cover in the lower area
- Move centre armrest forward

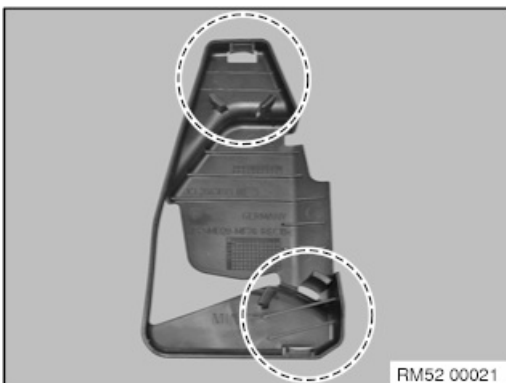


Installation note:

- Microencapsulated screws must be replaced and may not be reused.
- Screw connection must be completed within 20 minutes (start of hardening).
- Microencapsulated screws must not be retightened.
- Clean thread of nut in event of repeated use.



Unclip cover (1) for unlocking.

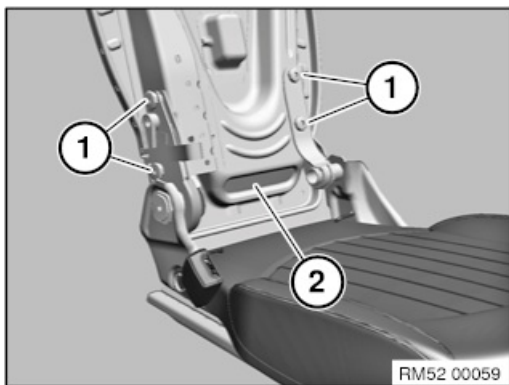


Installation note:

Retaining lugs must not be damaged.

If necessary, replace cover for unlocking.





Release screws (1).

Tightening torque 52 26 12AZ.

Remove backrest (2) from seat frame.

Installation note:

Replace screws (1).



Replacement only:

- Remove complete backrest cover
- Remove rear panel

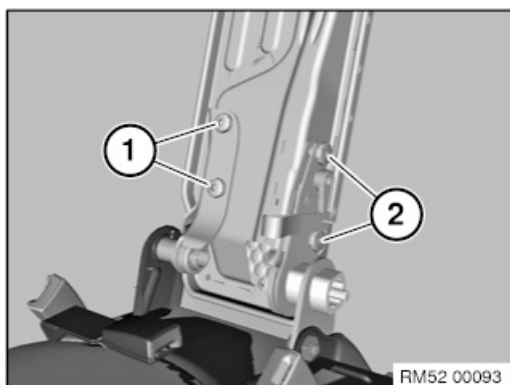


**Necessary preliminary tasks:**

- Remove middle backrest cover

**Installation note:**

- Microencapsulated screws must be replaced and may not be reused.
- Screw connection must be completed within 20 minutes (start of hardening).
- Microencapsulated screws must not be retightened.
- Clean thread of nut beforehand in event of repeated use.



Release screws (1).

Tightening torque 52 26 12AZ.

Installation note:

Replace micro-encapsulated screws (1).

Unfasten screws (2).

Remove backrest from seat frame.



52 26 001

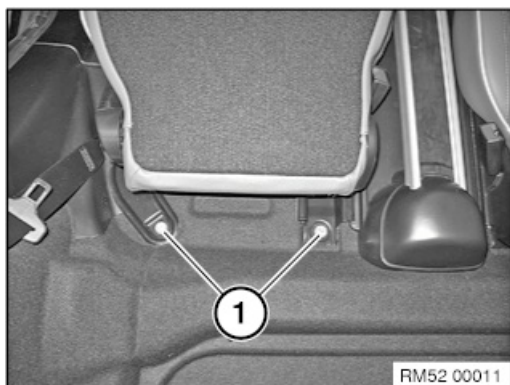
Removing and installing/replacing both rear seats



Note:

This work is identical with Remove and install left or right rear seat





Slide rear seat forward as far as it will go.

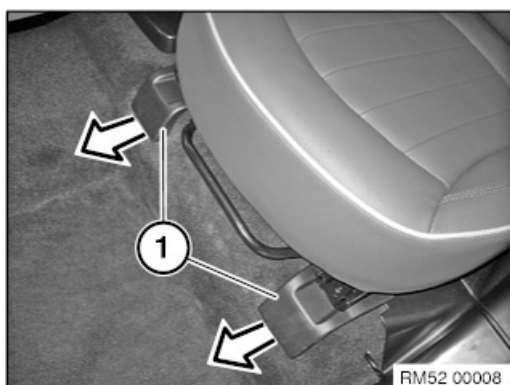
Tilt backrest forwards.

Release screws (1).

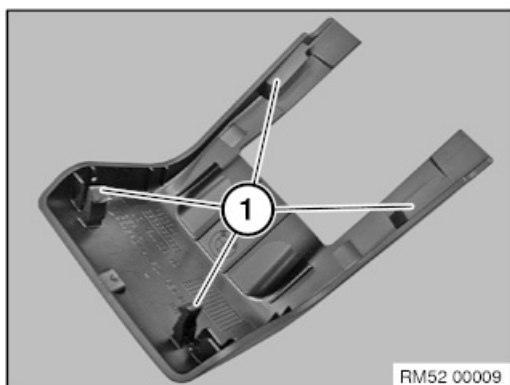
Installation note:

Replace screws.

Tightening torque 52 26 6AZ.



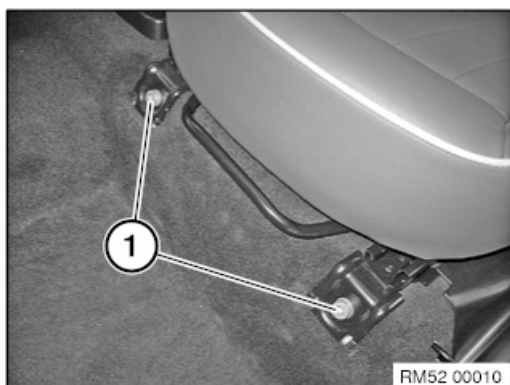
Pull off cover (1) on left and right forwards.



Installation note:

Retaining lugs (1) must not be damaged.

If necessary, replace faulty cover.



Slide rear seat backwards as far as it will go.

Release screws (1).

Installation note:

Replace screws.

Tightening torque 52 26 6AZ.





Important!

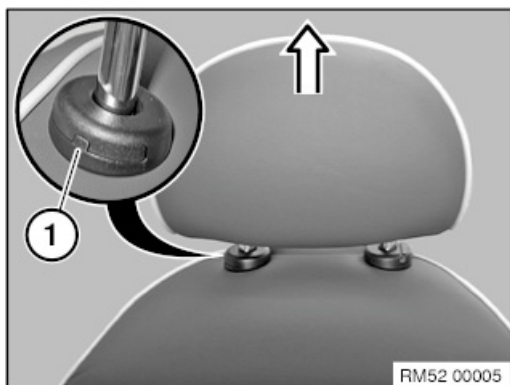
Cover entrance for protection purposes (risk of damage).

Lift out front seat.



52 26 388

Removing and installing/replacing rear middle head restraint



Move complete head restraint up as far as possible.

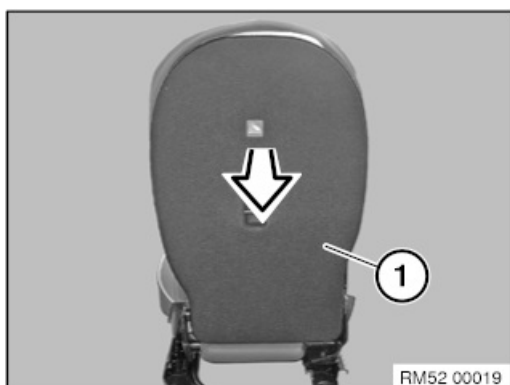
Press release (1) and pull out head restraint.



52 26 201 Removing and installing/replacing rear panel on left or right rear seat backrest (4-seater)



Lever out welt in marked area.



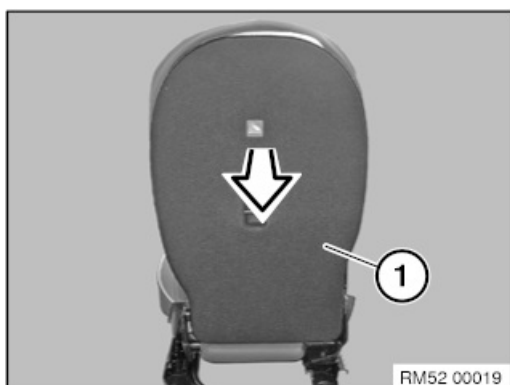
Take rear panel (1) off rear seat backrest.



52 26 199 Removing and installing/replacing rear panel on left rear seat back (5-seater).

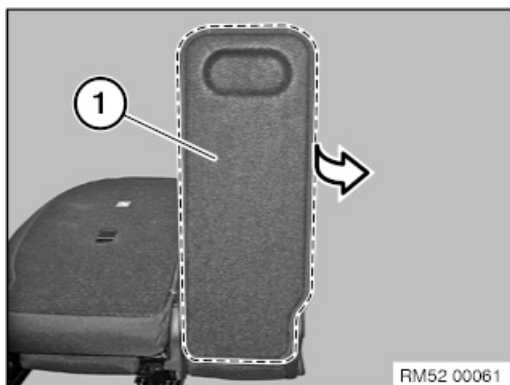


Lever out welt in marked area.



Take rear panel (1) off rear seat backrest.





Lever out welt in marked area.

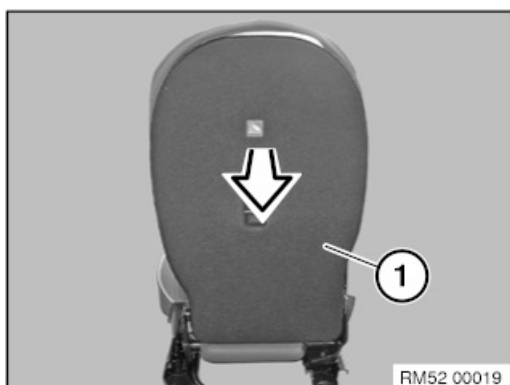
Take rear panel (1) off rear seat backrest.



52 26 200 Removing and installing/replacing rear panel on right rear seat backrest (5-seater)



Lever out welt in marked area.



Take rear panel (1) off rear seat backrest.





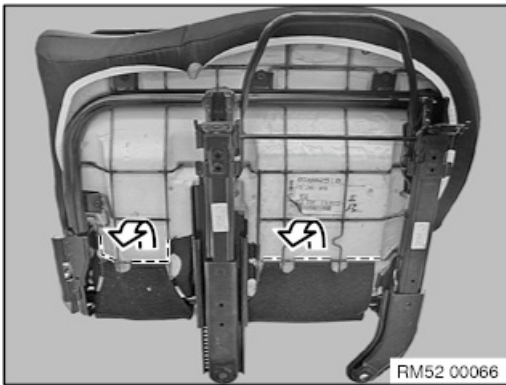
Special tools required:

- 52 0 050

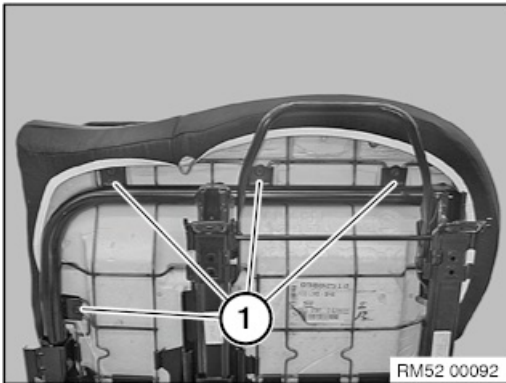


Necessary preliminary work:

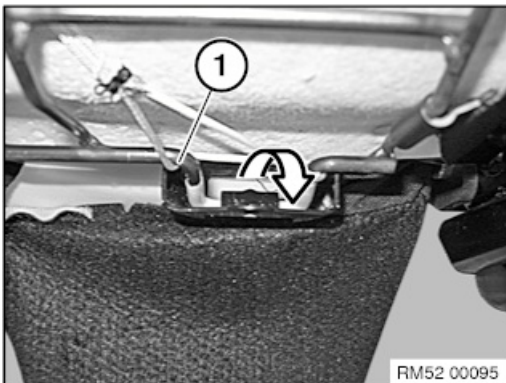
- Remove rear seat



Disengage welt of seat cover in marked area from wire frame.



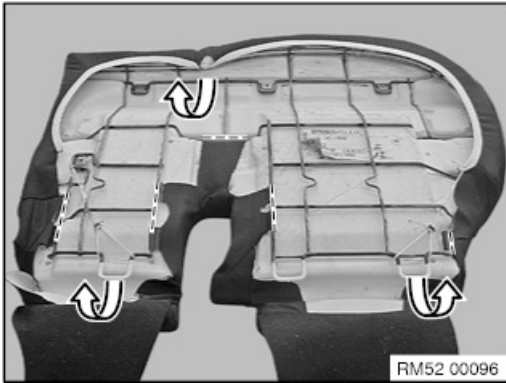
Release screws (1).



Feed wire frame (1) out of seat mechanism.

Remove seat cover with upholstery and wire frame from seat mechanism.

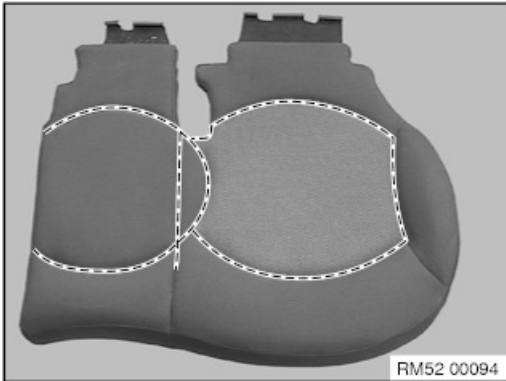




Detach welt from wire frame.

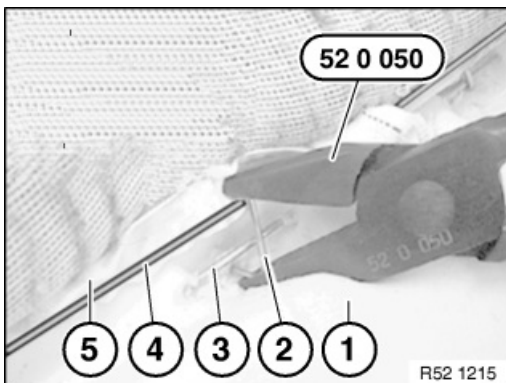
Detach tension strap from wire frame.

Remove seat cover with upholstery from the wire frame.



Detaching cover and upholstery:

- Disconnect all clamps in marked area
- Remove seat cover from padding
- Remove all remnants of retainers from cover and padding



Installation note:

Insert new clamp (2) with special tool 52 0 050 and bend closed.

1. Upholstery
2. Clamp
3. Trim wire in upholstery
4. OKE-strip in seat cover
5. Seat cover



52 26 045 Removing and installing/replacing seat frame for left or right rear seat (4-seater)



Necessary preliminary tasks:

- Remove backrest



Replacement only:

- Remove seat cover
- Remove the lower strap





Necessary preliminary tasks:

- Remove backrest



Replacement only:

- Remove seat cover
- Remove the lower strap.



52 26 039
(5-seater)

Removing and installing/replacing seat frame for rear seat, right



Necessary preliminary tasks:

- Remove backrest



Replacement only:

- Remove seat cover
- Remove the lower strap



**Special tools required:**

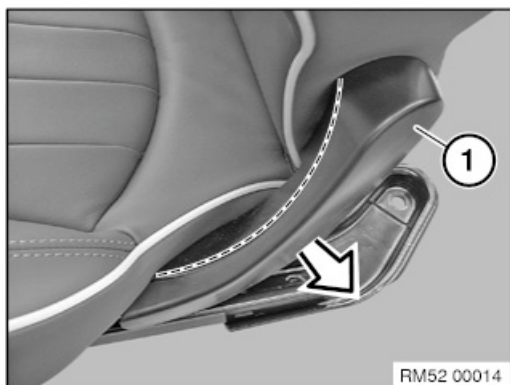
- 52 0 050

**Necessary preliminary work:**

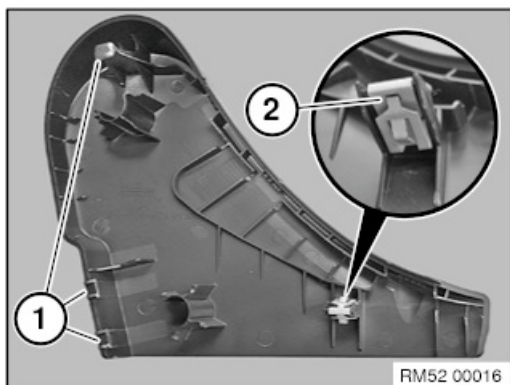
- Remove head restraint

**Warning!**

Seat and backrest frame of front seats have very sharp edges.
Danger of injury and damage!



Unclip outer fitting cover (1).

**Installation note:**

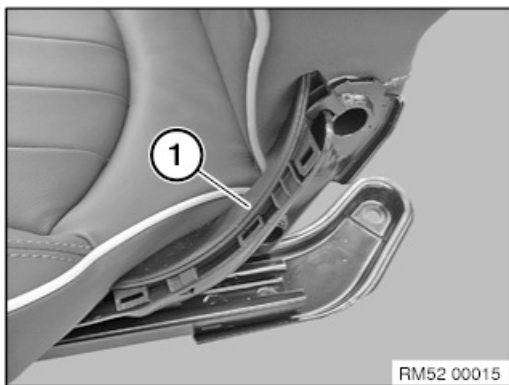
Retaining lugs (1) must not be damaged.

Metal clamp (2) must not be damaged.

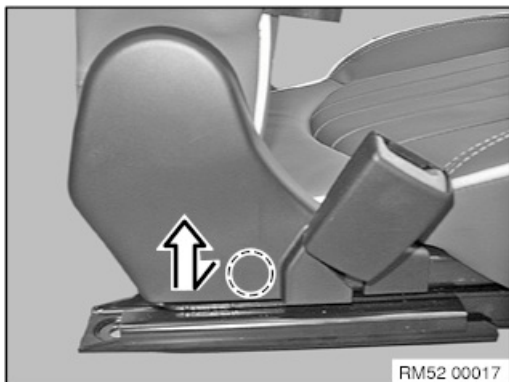
Pre-mount metal clamp (2) on fitting cover.

If necessary, replace faulty fitting cover or metal clamp.

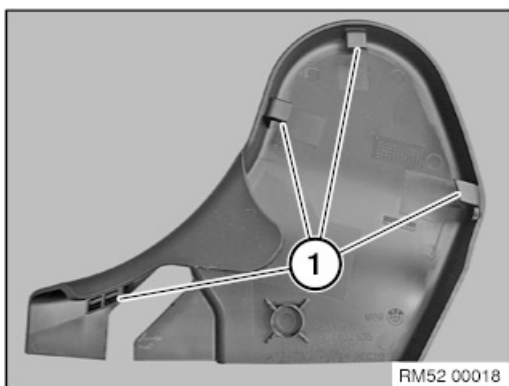




Remove the counterpart of the outer fitting cover (1).



Unclip the inner fitting cover in marked area and remove.
Remove inner fitting cover in direction of arrow.

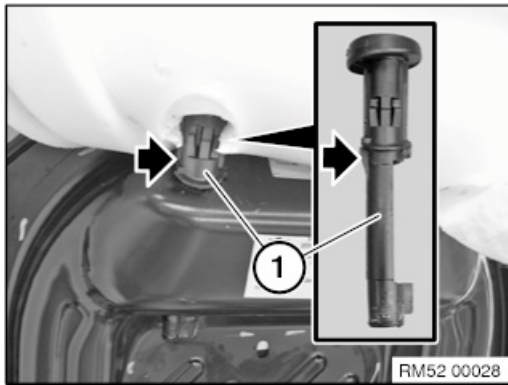


Installation note:
Retaining lugs (1) must not be damaged.
If necessary, replace faulty fitting cover.

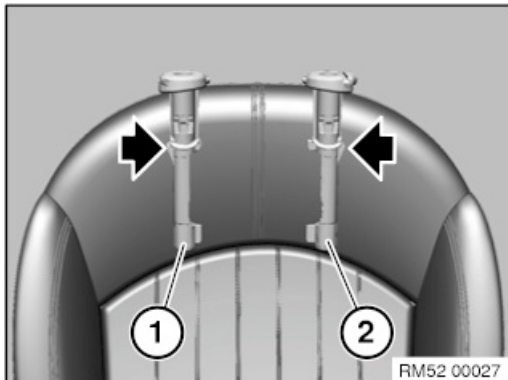


Lever out welt from backrest frame in marked area.



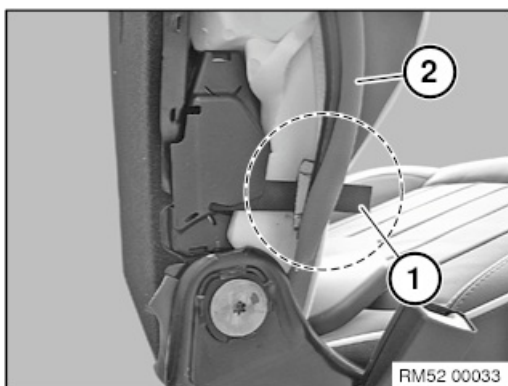


Fold the backrest cover upwards to expose the working area.
Press in retaining lug and remove guide sleeve upwards.
Remove backrest cover with upholstery from backrest frame.

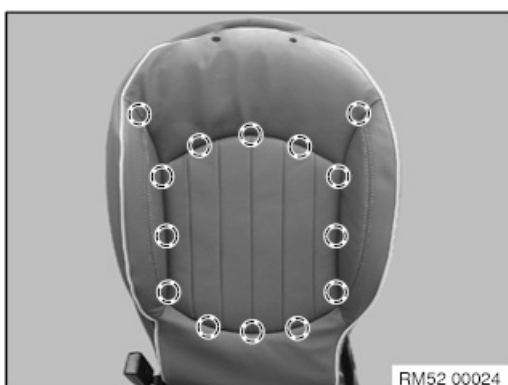


Installation note:
Retaining lugs must point outwards.

1. Guide sleeve without button
2. Guide sleeve with button



Installation note:
Feed in loop (1) through backrest cover (1).

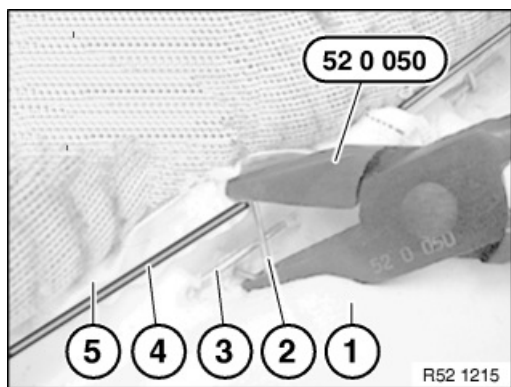


Release all clamps in marked area.
Remove seat cover from upholstery.

Important!

Remove all remnants of clamps from seat cover and upholstery.





Installation note:

Insert new clamp (2) with special tool 52 0 050 and bend closed.

1. Upholstery
2. Clamp
3. Trim wire in upholstery
4. OKE strip in backrest cover
5. Backrest cover



**Special tools required:**

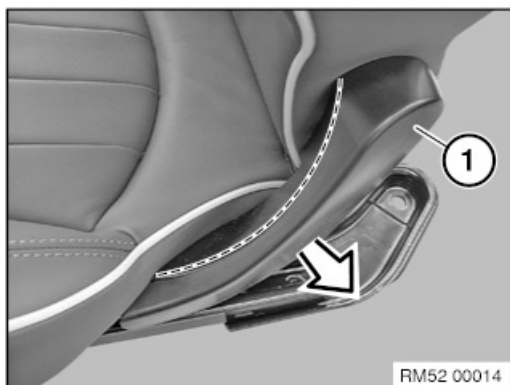
- 52 0 050

**Necessary preliminary work:**

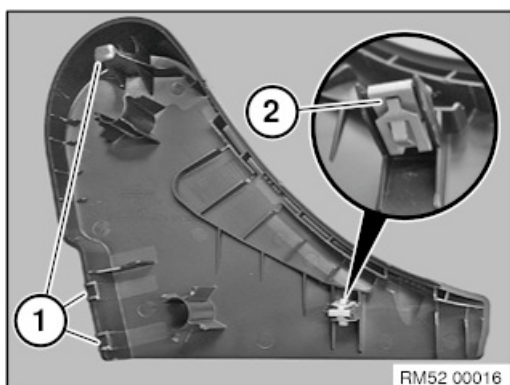
- Remove head restraint

**Warning!**

Seat and backrest frame of front seats have very sharp edges.
Danger of injury and damage!



Unclip outer fitting cover (1).

**Installation note:**

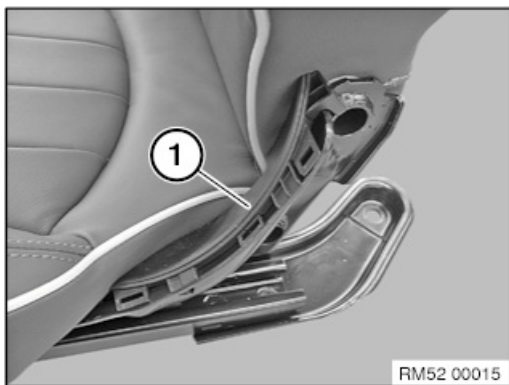
Retaining lugs (1) must not be damaged.

Metal clamp (2) must not be damaged.

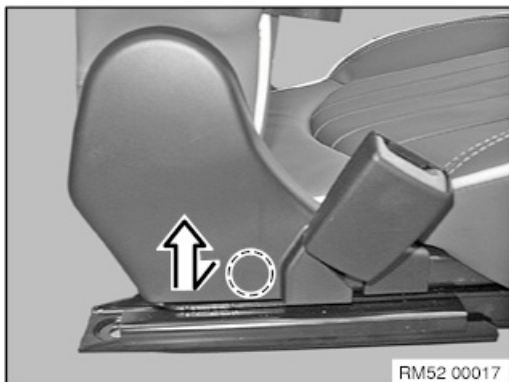
Pre-mount metal clamp (2) on fitting cover.

If necessary, replace faulty fitting cover or metal clamp.

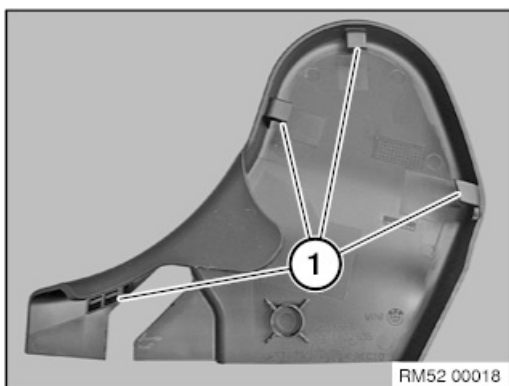




Remove the counterpart of the outer fitting cover (1).



Unclip the inner fitting cover in marked area and remove.
Remove inner fitting cover in direction of arrow.

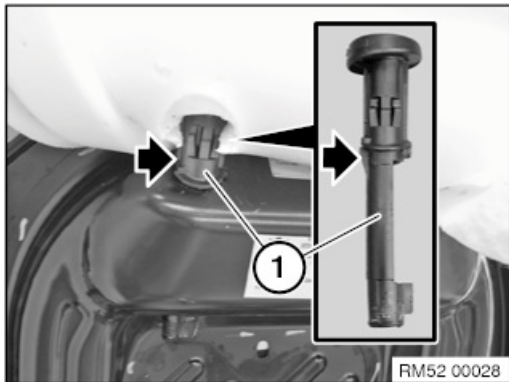


Installation note:
Retaining lugs (1) must not be damaged.
If necessary, replace faulty fitting cover.

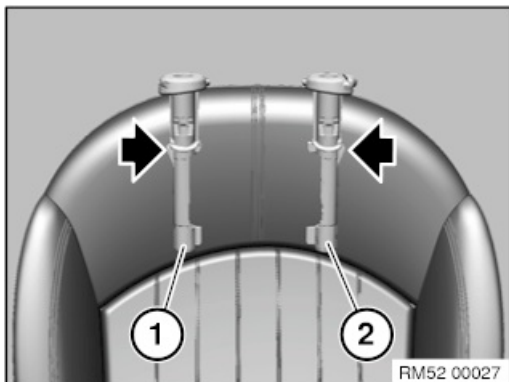


Lever out welt from backrest frame in marked area.



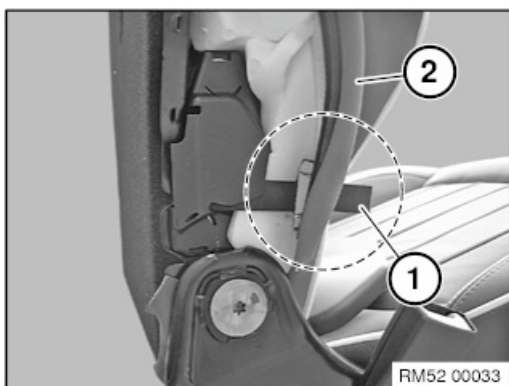


Fold the backrest cover upwards to expose the working area.
Press in retaining lug and remove guide sleeve upwards.
Remove backrest cover with upholstery from backrest frame.

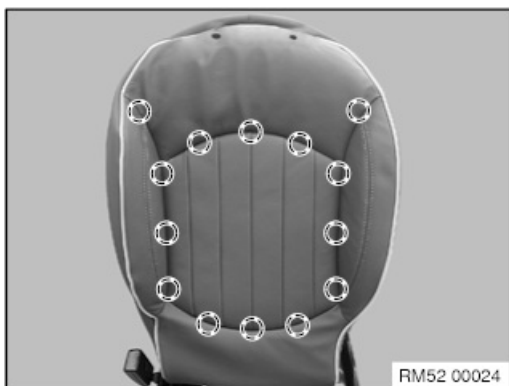


Installation note:
Retaining lugs must point outwards.

1. Guide sleeve without button
2. Guide sleeve with button



Installation note:
Feed in loop (1) through backrest cover (1).

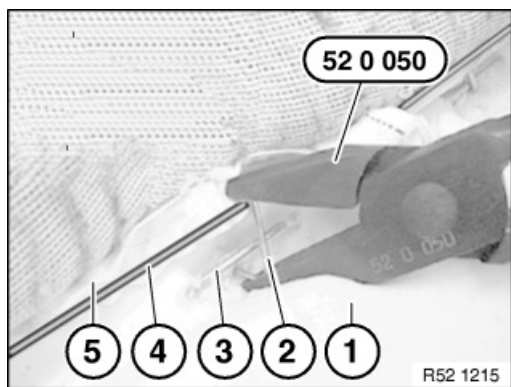


Release all clamps in marked area.
Remove seat cover from upholstery.

Important!

Remove all remnants of clamps from seat cover and upholstery.





Installation note:

Insert new clamp (2) with special tool 52 0 050 and bend closed.

1. Upholstery
2. Clamp
3. Trim wire in upholstery
4. OKE strip in backrest cover
5. Backrest cover

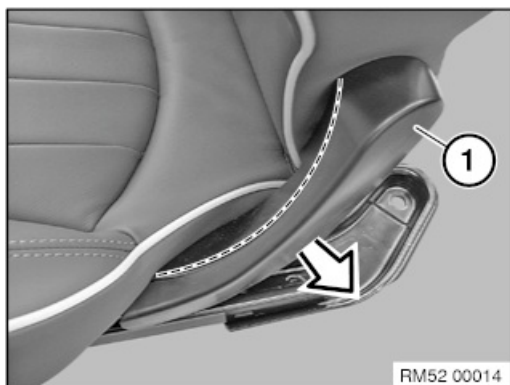


**Special tools required:**

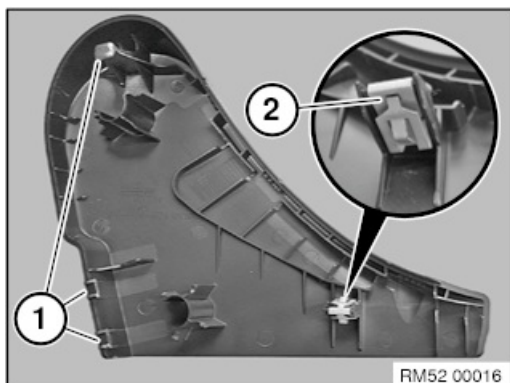
- 52 0 050

**Necessary preliminary work:**

- Remove rear seat



Unclip outer fitting cover (1).

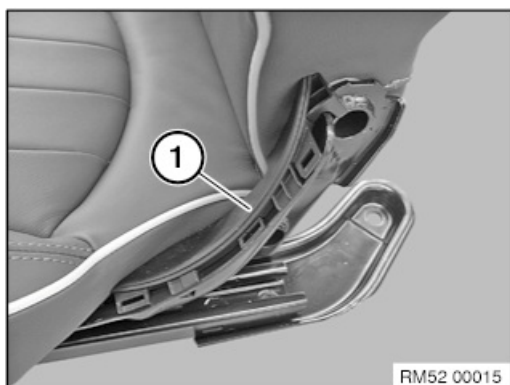
**Installation note:**

Retaining lugs (1) must not be damaged.

Metal clamp (2) must not be damaged.

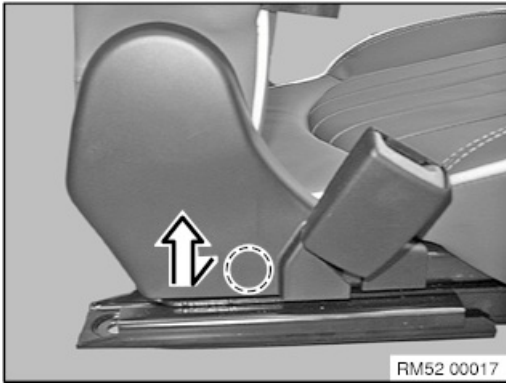
Pre-mount metal clamp (2) on fitting cover.

If necessary, replace faulty fitting cover or metal clamp.

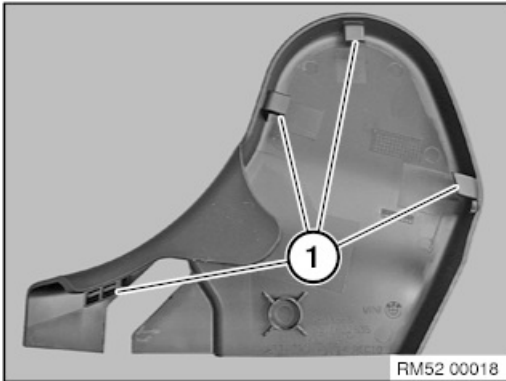


Remove the counterpart of the outer fitting cover (1).

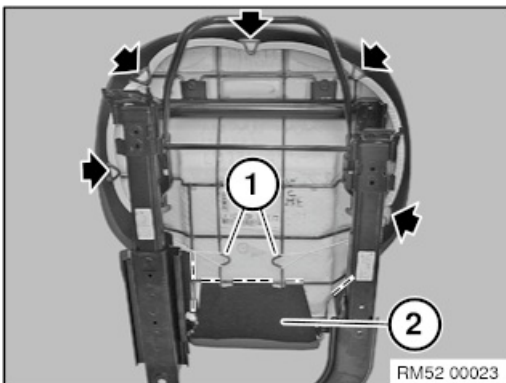




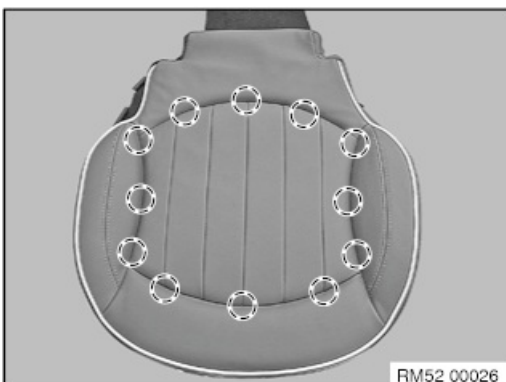
Unclip the inner fitting cover in marked area and remove.
Remove inner fitting cover in direction of arrow.



Installation note:
Retaining lugs (1) must not be damaged.
If necessary, replace faulty fitting cover.



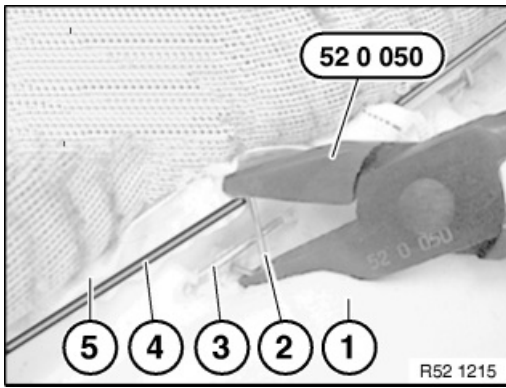
Detach the welt of the cover latch (2) in the marked area from the seat frame.
Detach the tensioning strap (1) from the seat frame.
Disengage seat cover in marked area from seat frame.



Detaching cover and upholstery:

- Disconnect all clamps in marked area
- Remove seat cover from padding
- Remove all remnants of retainers from cover and padding





Installation note:

Insert new clamp (2) with special tool 52 0 050 and bend closed.

1. Upholstery
2. Clamp
3. Trim wire in upholstery
4. OKE-strip in seat cover
5. Seat cover



**Special tools required:**

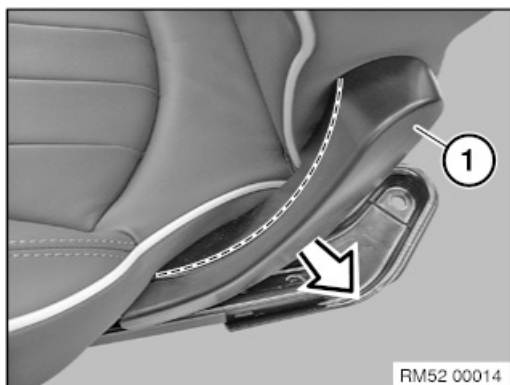
- 52 0 050

**Necessary preliminary work:**

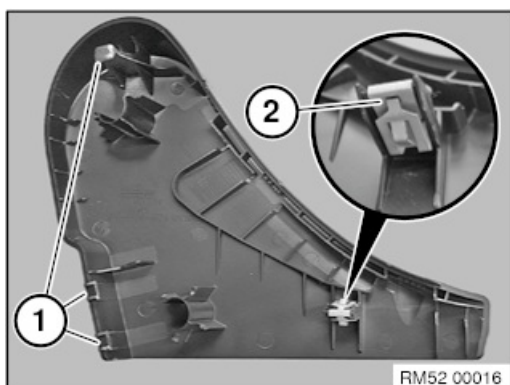
- Remove head restraint

**Warning!**

Seat and backrest frame of front seats have very sharp edges.
Danger of injury and damage!



Unclip outer fitting cover (1).

**Installation note:**

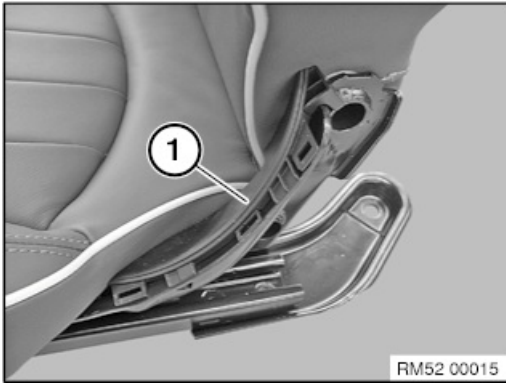
Retaining lugs (1) must not be damaged.

Metal clamp (2) must not be damaged.

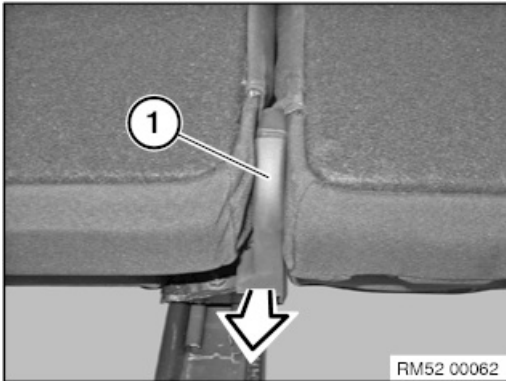
Pre-mount metal clamp (2) on fitting cover.

If necessary, replace faulty fitting cover or metal clamp.

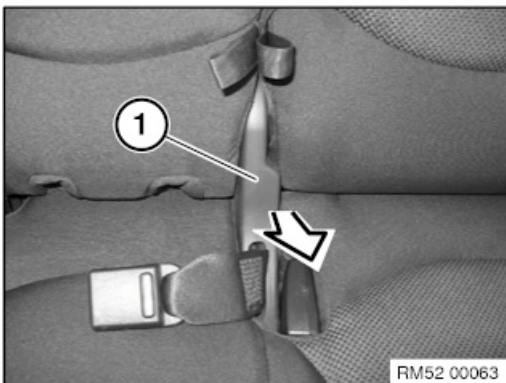




Remove the counterpart of the outer fitting cover (1).



Unclip the rear swivel bearing cover (1).

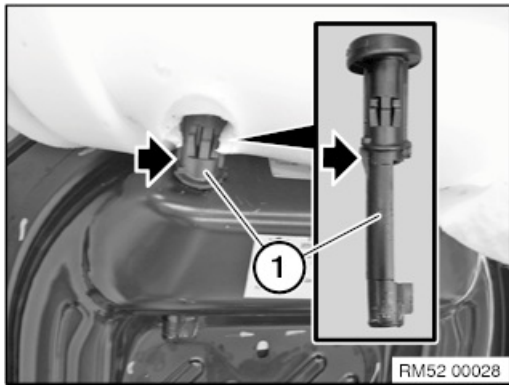


Remove the front swivel bearing cover (1). *Installation note:* Ensure correct seat and secure engagement of the front and rear swivel bearing covers.

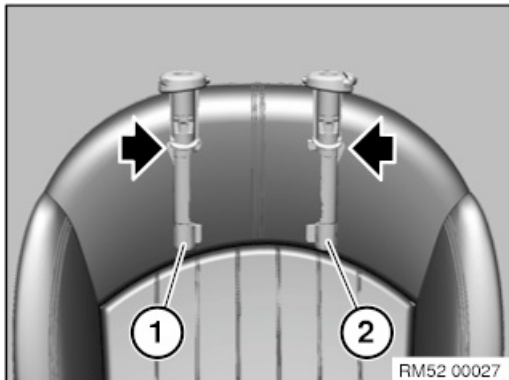


Lever out welt from backrest frame in marked area.



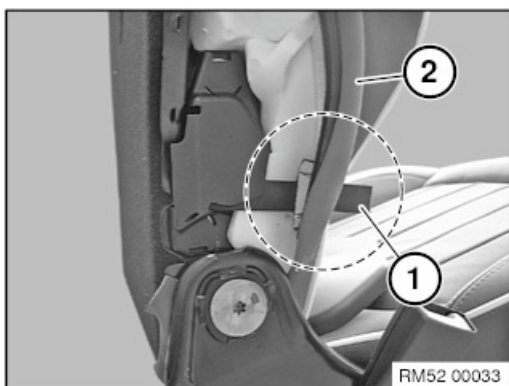


Fold the backrest cover upwards to expose the working area.
Press in retaining lug and remove guide sleeve upwards.
Remove backrest cover with upholstery from backrest frame.

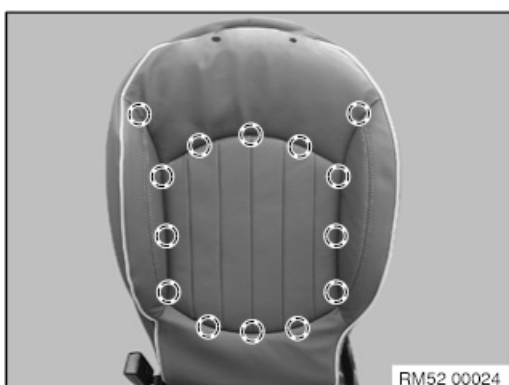


Installation note:
Retaining lugs must point outwards.

1. Guide sleeve without button
2. Guide sleeve with button



Installation note:
Feed in loop (1) through backrest cover (1).

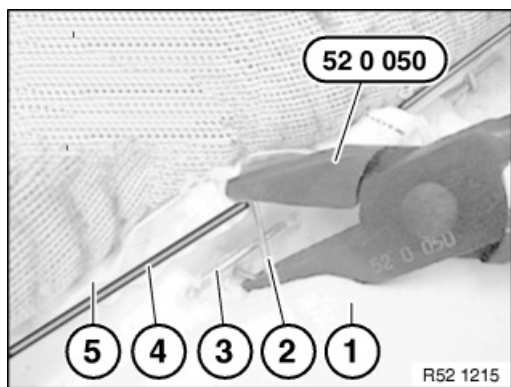


Release all clamps in marked area.
Remove seat cover from upholstery.

Important!

Remove all remnants of clamps from seat cover and upholstery.





Installation note:

Insert new clamp (2) with special tool 52 0 050 and bend closed.

1. Upholstery
2. Clamp
3. Trim wire in upholstery
4. OKE strip in backrest cover
5. Backrest cover



**Special tools required:**

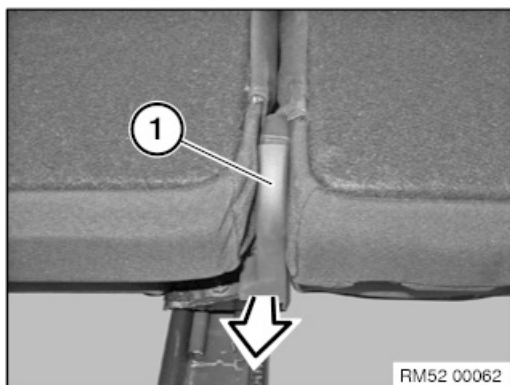
- 52 0 050

**Necessary preliminary work:**

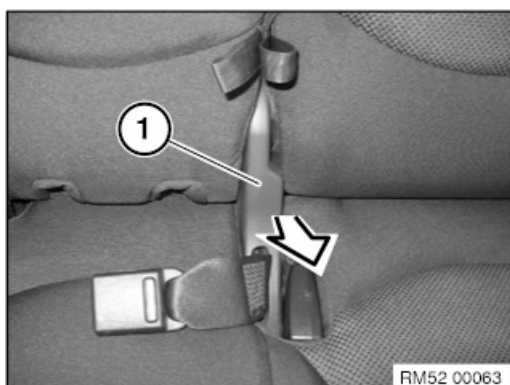
- Remove head restraint

**Warning!**

Seat and backrest frame of front seats have very sharp edges.
Danger of injury and damage!



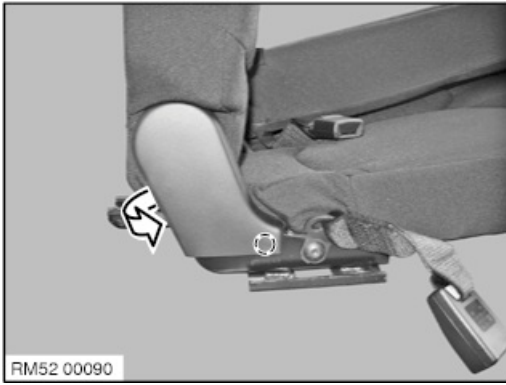
Unclip rear swivel cover (1).



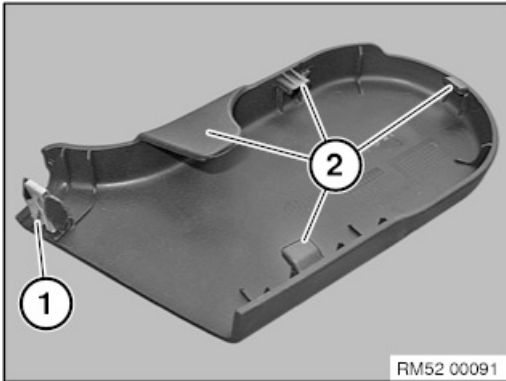
Remove front swivel cover (1). *Installation note:*

Make sure the front and rear swivel covers are correctly seated and securely latched.

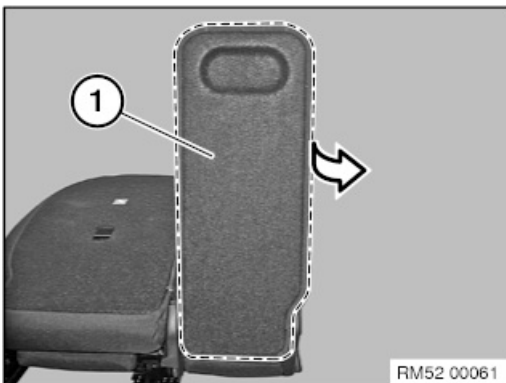




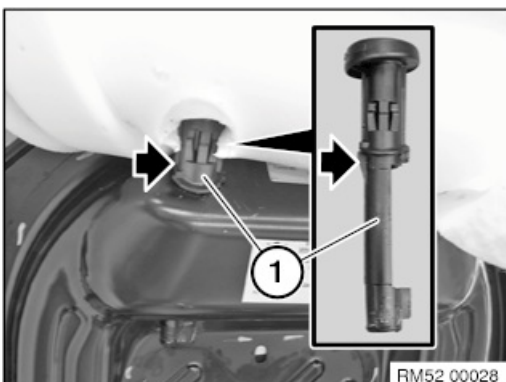
Unclip the inner fitting cover in marked area and remove.
Remove inner fitting cover in direction of arrow.



Installation note:
Retainer (1) must not be damaged.
Replace faulty clamp, if applicable.
Preassemble clamp (1) on fitting cover.
Retaining lugs (2) must not be damaged.
If necessary, replace faulty fitting cover.

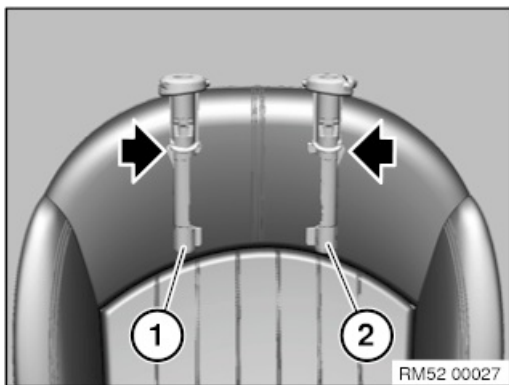


Lever welt in marked area (1) out of backrest frame.



Fold the backrest cover upwards to expose the working area.
Press in retaining lug and remove guide sleeve upwards.
Remove backrest cover with upholstery from backrest frame.



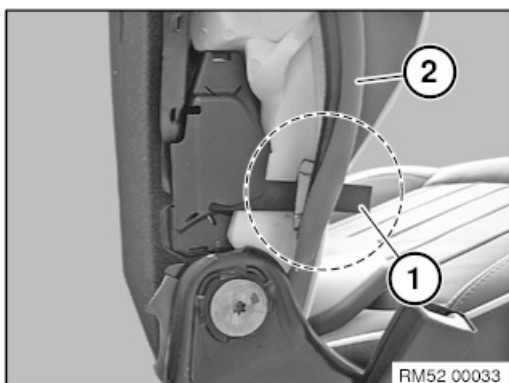


Installation note:

Replace faulty guide sleeves, if applicable.

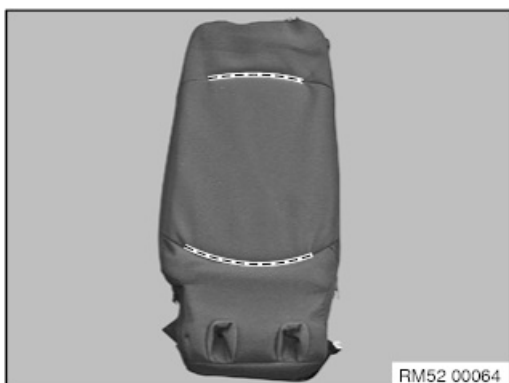
Retaining lugs must point outwards.

1. Guide sleeve without button
2. Guide sleeve with button



Installation note:

Feed in loop (1) through backrest cover (1).

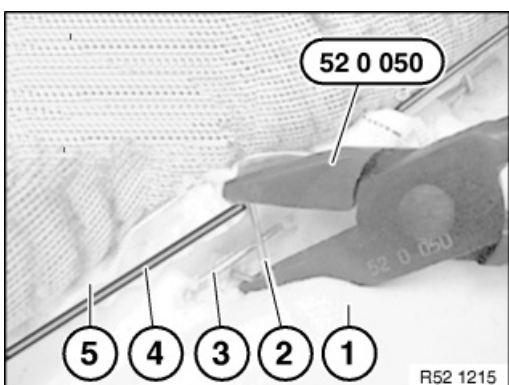


Release all clamps in marked area.

Remove seat cover from upholstery.

Important!

Remove all remnants of clamps from seat cover and upholstery.



Installation note:

Insert new clamp (2) with special tool 52 0 050 and bend closed.

1. Upholstery
2. Clamp
3. Trim wire in upholstery
4. OKE strip in backrest cover
5. Backrest cover



52 26 408

Replacing seat cover for both rear seats (4-seater)



Note:

Work is described under Remove seat cover for left or right rear seat



72 11 ... Checklist for front seat

Event		Check	Action
Has at least one belt tensioner and/or one side airbag been activated?	Yes	Check 1 (when installed): Check all seat adjustment options of both front seats. There must be no stiff movement, sticking or other functional problems or noises across the entire adjustment range of all the seat adjustment options. Check head restraints for damage. Check crash-active headrest for activation. Only 2-door model: Check backrest lock. Backrest must unlock and lock easily without any great physical effort.	If components are OK with regard to checks 1 and 2, only replace activated belt tensioner or side airbag. Otherwise, replace faulty parts on the seat/body. Replace belt tensioner, seat belt and, if necessary, side airbag.
		Check 2 (when dismantled): Check for deformation/damage on the following components: 1. All seat cross members on the body 2. Threaded support sleeves in the seat cross members 3. End fittings on the seat mechanism. Check for visible damage or deformation.	
	No	Check all adjustment options of the head restraints. Check crash-active headrest for activation.	Replace faulty parts.
Only seat with integrated seat belt:			
Does the backrest indicator light turn on when the backrest is locked and also when the backrest is shaken?	Yes	Check microswitch of backrest lock and renew if necessary. Check electrical lines and repair if necessary.	If there is still a fault, replace the entire seat
	No	No further action necessary.	





Screw securing adhesive is a means of preventing a screwed connection from being loosened by external influences.

Once the screw has been coated with adhesive, the adhesive remains inactive until such time that it is activated by the encapsulation breaking when the screw is inserted and then cures (hardens) at room temperature.



Installation note:

- Screw connection must be completed within 20 mins. (start of curing)
- Microencapsulated screws must not be retightened
- Thread of nut must be cleaned beforehand in event of repeated use



41 00 ... Notes on the water drain hose of the slide/tilt sunroof

The water drain hoses for the slide/tilt sunroof are partially permanently integrated in the body and cannot be replaced individually.

These water drain hoses can only be completely replaced with extensive body repair work (e. g. after an accident).

Component	Vehicle	Individually replaceable
Water drain hose, front	All BMW	No
	All MINI	
Rear water drain hose	E60, F34	No
	All other BMWs	Yes
	All MINI	Yes

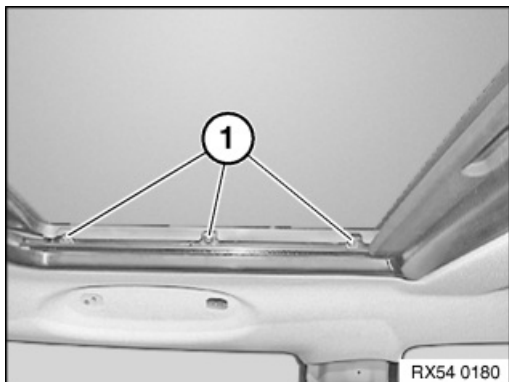
An individual solution is required for damage that was not caused by an accident.

Contact national hotline.



*Installation note:*

- Microencapsulated screws (Loctite) must be replaced and may not be reused
- Screw connection must be completed within 20 minutes (start of hardening)
- Microencapsulated screws must not be retightened
- Clean thread of nut beforehand in event of repeated use



Release left and right screws (1).

Tightening torque 54 12 04AZ.

Carefully remove the glass slide/tilt sunroof cover upwards.

Installation note:

Replace Torx screw and insert with Loctite.

Adjust glass slide/tilt sunroof cover.

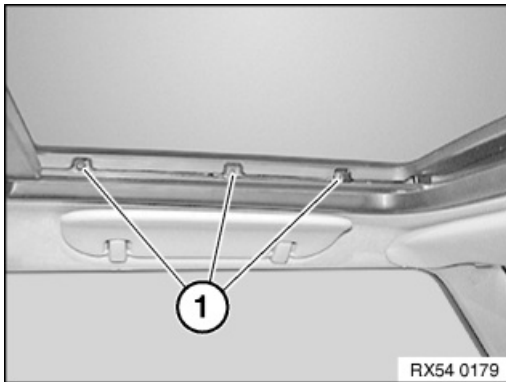
Carry out initialisation.





Installation note:

- Microencapsulated screws (Loctite) must be replaced and may not be reused
- Screw connection must be completed within 20 mins. (start of curing)
- Microencapsulated screws must not be retightened
- Clean thread of nut beforehand in event of repeated use



Release left and right screws (1).

Tightening torque 54 12 04AZ.

Carefully remove the glass slide/tilt sunroof cover upwards.

Installation note:

Replace Torx screw.

Adjust glass slide/tilt sunroof cover.

Carry out initialisation.



54 10 ... Repair instructions for bonded seals

1 General remarks on handling rubber seal profiles:

- If seals reveal partly detached protective film on delivery, they must not be bonded.
- Store seals at 5 °C to 40 °C.
- If, during the handling, the protective film has come off before bonding, it can still be bonded.
- Bonding at room and object temperature 25° ±5° C. Temperatures between 40 and 50 °C significantly increase initial adhesion.
- Seals, which are subjected to temperatures above 80 °C after bonding, will be very difficult to remove.
- Maximum storage time for replacement: see identification of the expiry date on packaging

2 Damage pattern, repair and replacement

A partially released bonding (rubber part adhesive tape or adhesive tape paint) up to 120 mm may be finished. Continue with Point 2.1.

A partially released bonding (rubber part adhesive tape or adhesive tape paint) above 120 mm may **not** be finished. Gasket must be replaced. Continue with Point 2.2.

2.1 Repair of partially released bonding (adhesive tape rubber part or adhesive tape paint)

2.1.1 Clean faulty areas

- Release adhesive area of paint side from recesses and degrease with cleaning agent R2. Stick to air drying time > of 1 minute. Never use paint thinner!
- This will usually partially destroy intact edge adhesive areas.
- When removing, it is important to wipe off the adhesive area of the adhesive tape with a lint-free disposable cloth. (e.g. Kintex blue, see BMW Parts Department)
- Carefully wipe off the adhesive areas.

Note:

Use necessary cotton- or fluff-free paper towel once only.

Do not touch the adhesive area after cleaning.

2.1.2 Apply adhesive

- Apply profile rubber adhesive evenly as a thin layer first on the gasket and then on the painted surface.
- Stick to air drying time of 2 to 3 minutes.

Important:

Avoid contact with skin!

Do not apply adhesive to visible painted surfaces.

2.1.3 Press in rubber seal

- Press down gasket using contact pressure (forced pressure not necessary) for > 1 minute.

Important:

Load can be applied to the bonding only after a period of 2 minutes. This waiting time is absolutely essential.

2.2 Replacement

2.2.1 Peeling off the faulty rubber seal

- Beginning at the stop, the gasket with the adhesive tape is slowly separated from the paint.



The gasket is slowly pulled off from an angle of approx. 20° while applying even tensile stress. If the gasket is pulled off too quickly, the adhesive tape can tear off and remain on the painted surface. The adhesive tape remaining on the painted surface must be removed with high cleaning costs.

Note:

When the adhesive tape separates from the gasket, the adhesive tape remaining on the paint must be fully separated at one location by approx. 10 mm until it is easy to grip.

Pull off the adhesive tape by pulling strongly at an angle of approx. 20°.

When existing gaskets are being peeled off with a hot air blower: Do not damage paintwork.

2.2.2 Clean bonding surface

- if required, remove adhesive remains with eraser disk, do not damage paint.
- Before a new bond, degrease the entire adhesive area with cleaning agent R2. Stick to air drying time > of 1 minute.

Note:

Use necessary cotton- or fluff-free paper towel once only.

Do not touch the adhesive area after cleaning.

2.2.3 Pull off protective film of the bonding surface

- Pull off the protective film off of the new gasket by approx. 15 cm using the tab.

Important:

Once the protective film has been removed, do not under any circumstances touch the exposed bonding surface.

2.2.4 Apply rubber seal

- Press on the gasket by hand continuously while pulling off the liner slightly at the same time.

Note:

If positioned incorrectly, the gasket can still be pulled off, repositioned and pressed on again.

Always ensure that you do not touch the bonding surface with your fingers or contaminate it in any way.

- Compress the gasket the corners; never stretch it. (critical area)

2.2.5 Establish sealing joint

- Where the beginning and end meet, a mark is created from pressing the loose end onto the beginning of the gasket.
Cut off the gasket vertically along the marked line (use sharp knife or special scissors) and press in place.
- Visually check the pre-bonded gasket.

Note:

Small areas of gasket can remain stuck to adhesive tape of loose end.

2.2.6 Press gasket

- Press gasket by hand or hand roller
- Adhesive tape width up to 5 mm, contact pressure > 5 N/cm²



- Adhesive tape width up to 10 mm, contact pressure $> 10 \text{ N/cm}^2$

Note:

Firm thumb pressure has approx. 35 N/cm^2

3 Checking the rubber seal

- Check the bonded gaskets for correct positioning and perfect adhesion. The bonding can be checked by pressing back the sealing lip.
- The peel strength of the gasket must be greater than 10 N/cm^2 for about 15 min after bonding.



**Special tools required:**

- 00 9 315
- 00 9 340

*Note:*

Make the adjustment with an assistant.

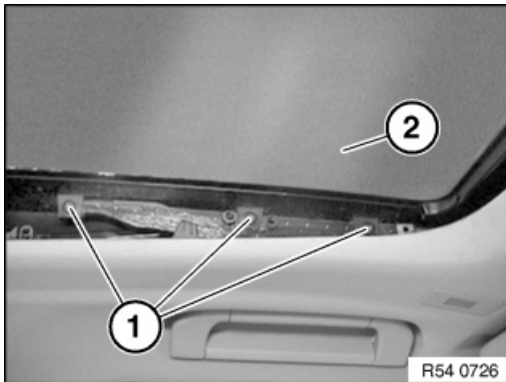
Necessary preliminary tasks:

- Close glass slide/tilt sunroof completely

If the glass slide/tilt sunroof is outside the adjustment tolerances, adjust as follows:

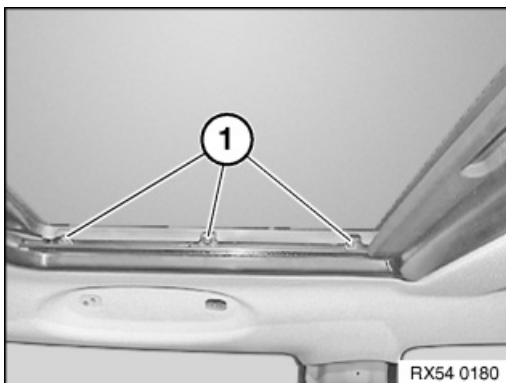
*Installation note:*

- Microencapsulated screws (Loctite) must be replaced and may not be reused
- Screw connection must be completed within 20 minutes (start of hardening)
- Microencapsulated screws must not be retightened
- Clean thread of nut beforehand in event of repeated use

**Adjusting front glass slide/tilt sunroof unit:**

Carry out the following step on one side first and then the other (first left, then right or vice versa):

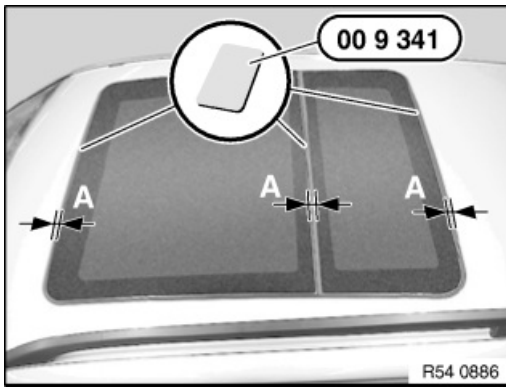
- Loosely screw Torx screws (1) on left/right so that glass roof panel (2) can still be moved.
- Move glass roof panel (2) as required
- Make sure all screws are tightened down.
- Tightening torque 54 12 4AZ.
- Repeat procedure on other side.

**Adjusting front glass slide/tilt sunroof unit:**

Carry out the following step on one side first and then the other (first left, then right or vice versa):

- Loosely screw Torx screws (1) on left/right so that glass roof panel (2) can still be moved.
- Move glass roof panel (2) as required
- Make sure all screws are tightened down.
- Tightening torque 54 12 4AZ.
- Repeat procedure on other side.



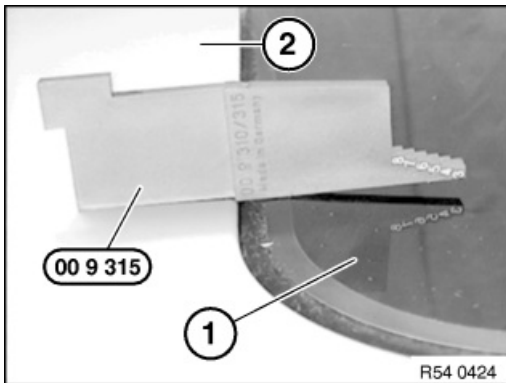


Distance setting:

Use special 00 9 340 tool check that the gap between the glass slide/tilt sunroof cover and body is the same.

Slide special tool 00 9 340 or similar between gasket and insert. It must be possible to slide the card against the same level of resistance.

Slide glass slide/tilt sunroof cover towards front or rear until ideal position is reached.



Height adjustment:

Note:

Front glass slide/tilt sunroof cover must be adjusted first.

Check height of glass slide/tilt sunroof cover (1) in relation to body (2) with special tool 00 9 315 .

Press glass slide/tilt sunroof cover (1) at front and rear upwards or downwards until ideal position is reached.

Height:

- Front edge of glass slide/tilt sunroof cover at front 0 to 1 mm under roof edge
- Rear edge of front glass slide/tilt sunroof cover 0 to 0.5 mm above rear glass slide/tilt sunroof cover
- Rear edge of glass slide/tilt sunroof cover 0 to 1 mm above roof edge

Check function and adjustment.

Carry out initialization.





Note:

This operation is described in:

- Adjusting both glass slide/tilt sunroof covers



54 00 ... Notes on panorama glass roof (initialization/normalization/learning of characteristic curve)



Note:

Initialization comprises:

- Normalization
- Learning characteristic curve

The mechanical end positions are recorded and stored during normalization.

The characteristic curve is learnt immediately after normalization.

When the characteristic curve is learnt, the mechanical closing forces of the panorama glass roof are recorded and stored for correct operation of the anti-trapping mechanism.



Note:

Then carry out an **initialization**:

- if the panorama glass roof has been mechanically moved by means of the emergency actuator
- in the event of malfunctions, e.g. no one-touch function, no opening or no comfort function possible
- after disengagement of the drive unit
- after work is carried out on the mechanism of the panorama glass roof
- after the control unit has been replaced

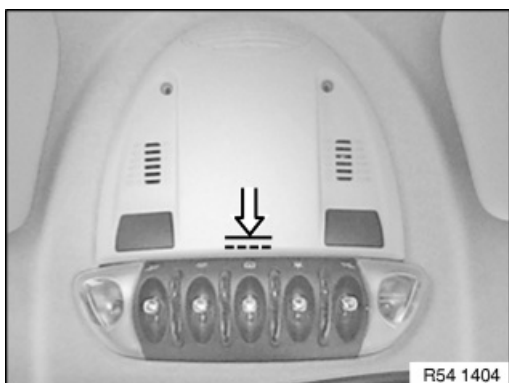


Warning!

There is no anti-trapping protection during initialization.

Ensure an adequate power supply during initialization.

Start vehicle engine.



Normalization:

- Panorama glass roof can be initialized in each localized position
- Actuate switch during the entire procedure
- Actuate and hold switch in the first of the two possible positions in the "Close" direction





- Panorama glass roof moves a few centimetres
- Continue actuating switch in this position



Learning characteristic curve:

The curve is learnt in the following steps:

- After normalization, keep switch actuated and held in the "Close" direction in the first position
- Panorama glass roof closes completely after 30 seconds
- Panorama glass roof opens completely
- Then the panorama glass roof moves into the "closed" position
- Release switch.



Note:

- The entire operation lasts approx. 75 seconds
- Learning of the curve is terminated when the switch is released
- If the switch is released in the meantime, the entire procedure must be repeated
- On completion of successful initialization, the corresponding messages in the check control and the control display go out
- Carry out function check (tip function, anti-trapping protection and, if necessary, comfort function)



41 00 ... Notes on the water drain hose of the slide/tilt sunroof

The water drain hoses for the slide/tilt sunroof are partially permanently integrated in the body and cannot be replaced individually.

These water drain hoses can only be completely replaced with extensive body repair work (e. g. after an accident).

Component	Vehicle	Individually replaceable
Water drain hose, front	All BMW	No
	All MINI	
Rear water drain hose	E60, F34	No
	All other BMWs	Yes
	All MINI	Yes

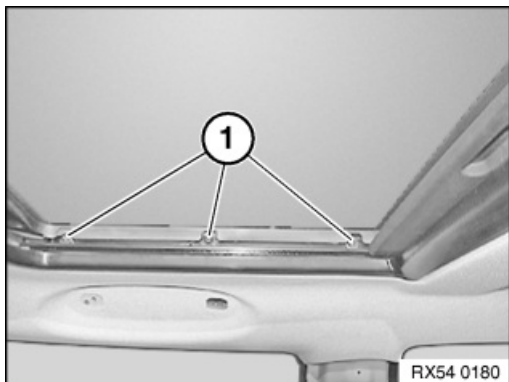
An individual solution is required for damage that was not caused by an accident.

Contact national hotline.



*Installation note:*

- Microencapsulated screws (Loctite) must be replaced and may not be reused
- Screw connection must be completed within 20 minutes (start of hardening)
- Microencapsulated screws must not be retightened
- Clean thread of nut beforehand in event of repeated use



Release left and right screws (1).

Tightening torque 54 12 04AZ.

Carefully remove the glass slide/tilt sunroof cover upwards.

Installation note:

Replace Torx screw and insert with Loctite.

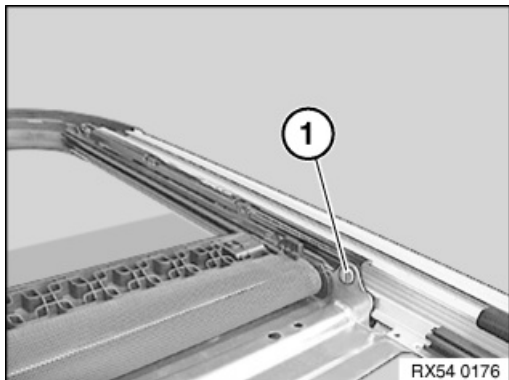
Adjust glass slide/tilt sunroof cover.

Carry out initialisation.

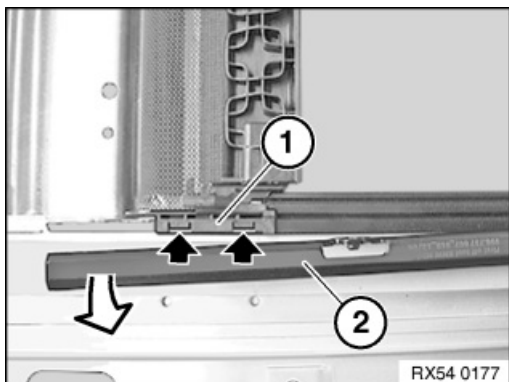


**Necessary preliminary work:**

- Remove glass slide/tilt sunroof cover at rear



Release screws (1) on left and right.

**Note:**

The right side is removed in the same way as the left side.

Carefully raise rear glass lid mechanism (2).

Unlock retaining lugs and lift out roller sunblind (1).

Installation note:

Retaining lugs on roller sunblind must not be damaged.

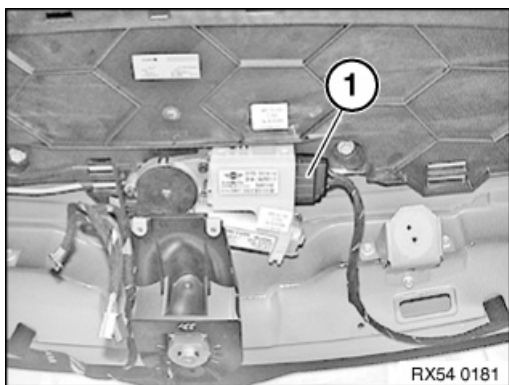


**Special tools required:**

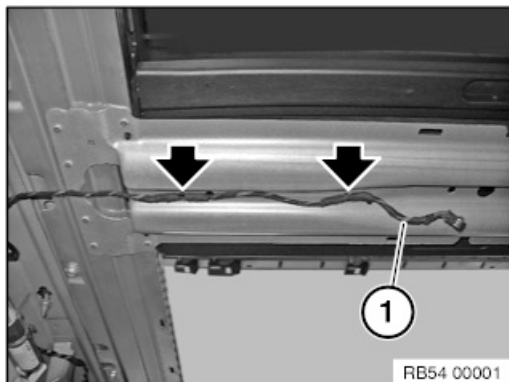
- 54 1 120

**Necessary preliminary tasks:**

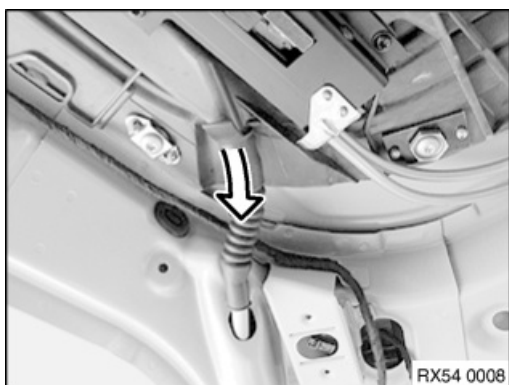
- **R60:**
Remove headlining
- **R61:**
Lower roofliner



Unfasten plug connection (1) and disconnect.



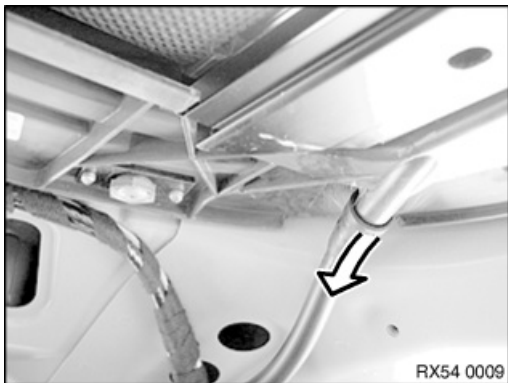
Unclip wiring harness (1). *Installation note:*
If necessary, replace cable clips.



Detach front water drain hoses. *Installation note:*
Make sure water drain hoses are correctly seated.

Water ingress into passenger compartment is possible if water drain hoses are not correctly fitted.





Detach rear water drain hoses. *Installation note:*
Make sure water drain hoses are correctly seated.

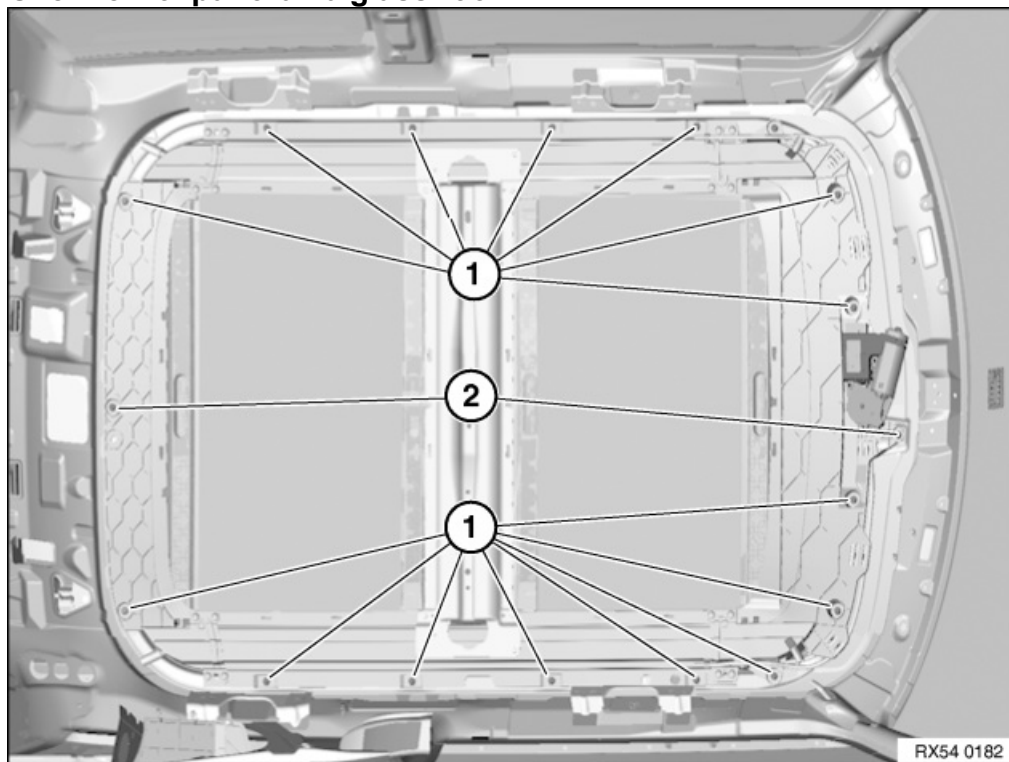
Water ingress into passenger compartment is possible if water drain hoses are not correctly fitted.



Important!

Two persons are required to help in removing the panorama glass roof.

Overview of panorama glass roof:



- Release screws (1).
- Tightening torque 54 12 05AZ.
- An assistant must secure the panorama glass roof to prevent it falling.

Important! Do not damage any surrounding components when removing the panorama glass roof.

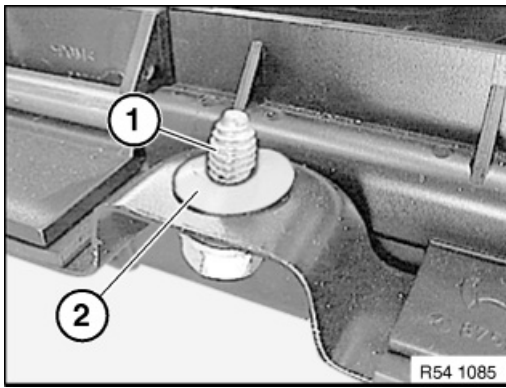
- Unfasten screws (2).
- Carefully lower the panorama glass roof and remove from vehicle towards rear through tailgate opening.



Replacement:

- Carry out vehicle programming/encoding





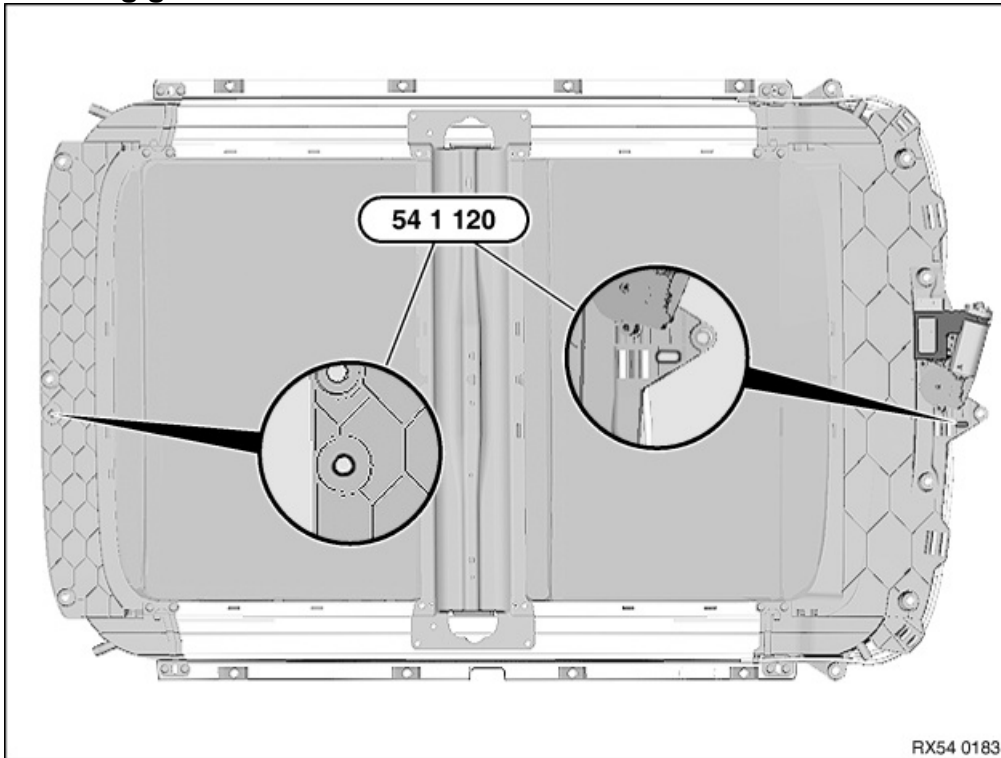
Installation note:

If necessary, remove fabric adhesive tape.

To stop creaking noises, secure all screws (1) prior to installation with plastic washers (2).

If the standard screws can no longer grip, use "repair screws" (larger threads).

Installing glass slide/tilt sunroof:



Installation note:

To align the panorama glass roof to the body aperture, insert screws and tighten loosely.

The panorama glass roof must still be able to move in the body aperture.

On account of leaks, the panorama glass roof must be exactly aligned to body aperture.

Insert special tool 54 1 120 into the centring bores in panorama glass roof and body fully.

Panorama glass roof glides into place.

Tighten down screws.

Tightening torque 54 12 05AZ.

Important!

Do not crush any cables when installing the panorama glass roof.

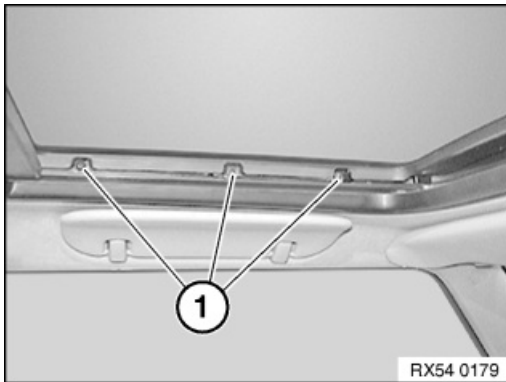
Initialise the panorama glass roof.





Installation note:

- Microencapsulated screws (Loctite) must be replaced and may not be reused
- Screw connection must be completed within 20 mins. (start of curing)
- Microencapsulated screws must not be retightened
- Clean thread of nut beforehand in event of repeated use



Release left and right screws (1).

Tightening torque 54 12 04AZ.

Carefully remove the glass slide/tilt sunroof cover upwards.

Installation note:

Replace Torx screw.

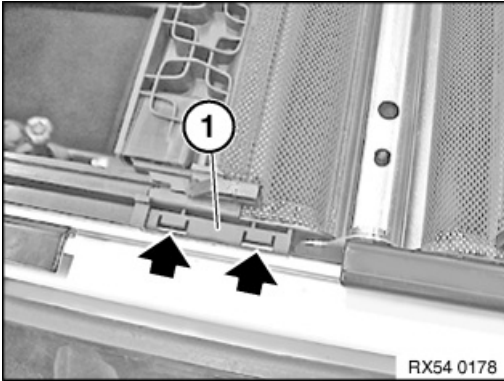
Adjust glass slide/tilt sunroof cover.

Carry out initialisation.



**Necessary preliminary work:**

- Remove glass slide/tilt sunroof cover at front and rear

**Note:**

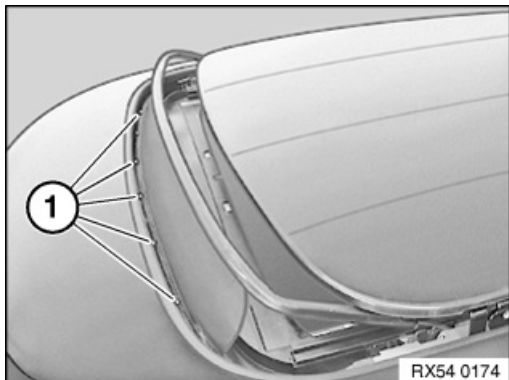
The right side is removed in the same way as the left side.

Unlock retaining lugs and lift out roller sunblind (1). *Installation note:* Retaining lugs on roller sunblind must not be damaged.

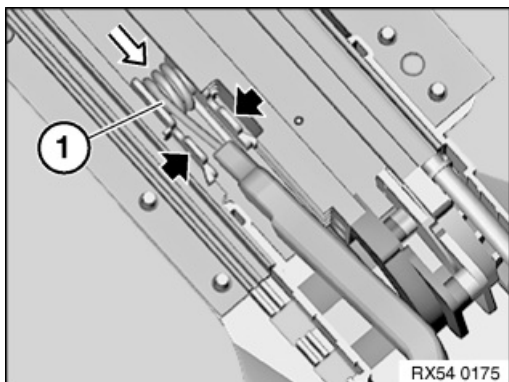


**Necessary preliminary work:**

- Open glass slide/tilt sunroof



Remove screws (1) or unclip the wind deflector in areas (1).

**Note:**

The right side is removed in the same way as the left side.

Press retaining lugs and slide spring joint (1) forwards up to recess in rail profile.

Remove spring joint towards top from rail profile.

Installation note:

Make sure rail profile is at correct installed height.

**Installation note:**

If necessary, initialise panorama glass roof.



**Necessary preliminary tasks:**

- Remove complete glass slide/tilt sunroof
- Remove roller sun blind
- Remove wind deflector
- Remove drive

**Replacement part scope for panorama glass roof frame without:**

- Roller sunblind,
- wind deflector,
- glass slide/tilt sunroof panel and
- Power train





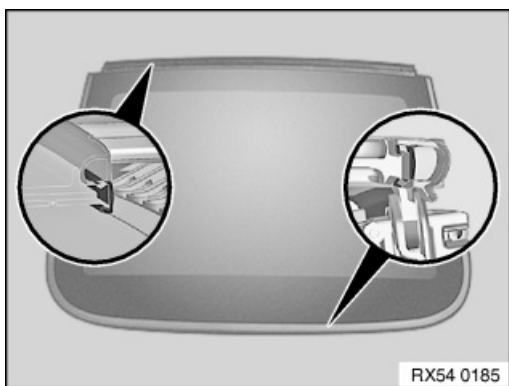
Necessary preliminary work:

- Remove glass slide/tilt sunroof cover at rear



Note:

Follow repair instructions for bonded seals on panorama glass roof.



Pull seals off glass slide/tilt sunroof cover. *Installation note:*

- Clean bonding surface with adhesive remover (sourcing reference, refer to EPC, Electronic Parts Catalogue)
- Press seal without stretching (squashing).
- Stick on seal in sections

Important!

Do not touch adhesive area.

Surface temperature $\geq 20\text{ }^{\circ}\text{C}$

Incorrect bonding of the seal will result in leaks.

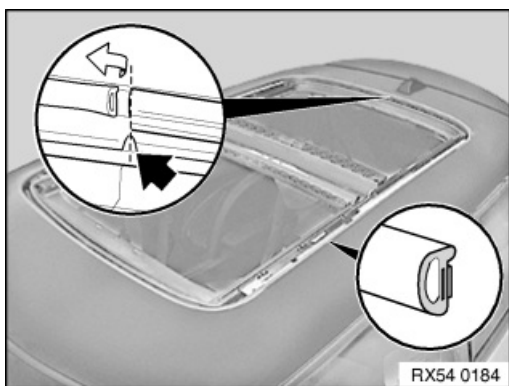


**Necessary preliminary tasks:**

- Remove panorama glass roof completely

**Note:**

Follow repair instructions for bonded seals on panorama glass roof.



Pull off seal at contact edge starting from body aperture (peel off). *Installation note:*

- Clean bonding surface with adhesive remover (sourcing reference, refer to EPC - Electronic Parts Catalogue).
- Press seal without stretching (squashing).
- Stick on seal in sections.
- Establish seal joint.

Important!

Do not touch bonding surface.

Surface temperature ≥ 20 °C

Incorrect bonding of the gasket will result in leakage.



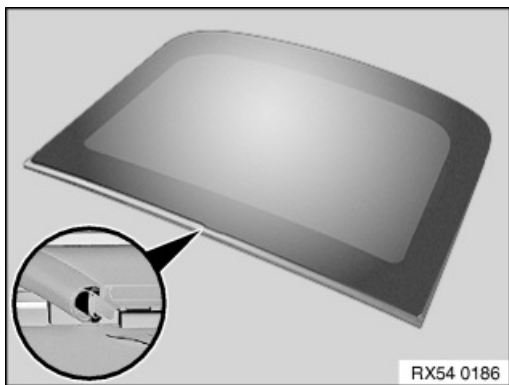


Necessary preliminary work:

- Move front glass slide/tilt sunroof cover to vent position

Note:

Follow repair instructions for bonded sealing on glass slide/tilt sunroof.



Pull seal off glass slide/tilt sunroof cover. *Installation note:*

- Clean bonding surface with adhesive remover (sourcing reference, refer to EPC - Electronic Parts Catalogue)
- Press seal without stretching (squashing)
- Stick on seal in sections

Important!

Do not touch adhesive area.

Surface temperature $\geq 20^{\circ}\text{C}$

Incorrect bonding of the sealing will result in leaks.





Screw securing adhesive is a means of preventing a screwed connection from being loosened by external influences.

Once the screw has been coated with adhesive, the adhesive remains inactive until such time that it is activated by the encapsulation breaking when the screw is inserted and then cures (hardens) at room temperature.



Installation note:

- Screw connection must be completed within 20 mins. (start of curing)
- Microencapsulated screws must not be retightened
- Thread of nut must be cleaned beforehand in event of repeated use



61 00 ... Battery charging calendar

Battery charging calendar 2016 (PDF file)

Battery charging calendar 2017 (PDF file)

Battery charging calendar 2018 (PDF file)

Battery charging calendar 2019 (PDF file)

Information for the battery charging calendar



61 00 ... Battery log form

Battery log form 2016

Battery log form 2017

Battery log form 2018

Battery log form 2019



61 20 ... Battery replacement information

A vehicle battery is constructed for the installation location and the individual power requirements of the particular vehicle. These individual power requirements depend on the motorisation and different types of optional equipment. The individually assigned vehicle battery is the ideal compromise between the power requirements of the vehicle electrical system and the weight and service life of the vehicle battery.

If the vehicle electrical system of electric vehicles is not accessible due to a faulty 12 V battery, proceed as follows:

Battery exchange in electrified vehicles

Vehicles with the automatic engine start-stop function or particular engine types and optional equipment are equipped with a special vehicle battery (AGM battery), since only this battery type can provide elevated power requirements over the extended service life. Installing a different vehicle battery can cause problems with vehicle electronics, can reduce functions or can cause leakage of battery acid.

In the event of an accident where the airbags are deployed in vehicles with a vehicle battery in the luggage compartment, the electrical connection between the vehicle battery and the trigger is automatically disconnected through pyrotechnics. This prevents possible short-circuiting.

Proper operation of all of these safety and convenience functions requires a battery that conforms with specifications and that is properly registered in vehicles with energy management systems (IBS, power module).

Vehicles with energy management systems (IBS, power module): Register battery exchange.

The vehicle electrical system is informed about the vehicle battery characteristic data, such as type, size, age and current power capacity. Therefore, there will always be only one work scope provided that is permitted by the current status of information.

When installing a new vehicle battery, the battery must be registered and thus must also be registered with the vehicle electrical system.

Diagnosis system:

Register battery exchange.

- Service functions
- Body
- Voltage supply
- Register battery exchange

When retrofitting, a more powerful battery may be used. Standard batteries may always be replaced by AGM batteries with the same specifications.

When installing a battery of a different size or a different battery type, this change in vehicle data must be programmed into the vehicle data in accordance with specifications.

Programming system:

- Battery retrofitting



**Important!**

Observe safety informations for handling vehicle battery.

**There are two ways to carry out a voltage interruption of the 12-V battery:**

1. Manually by disconnecting the battery earth lead
2. With the diagnosis system

1. Manually: Carry out the following steps:

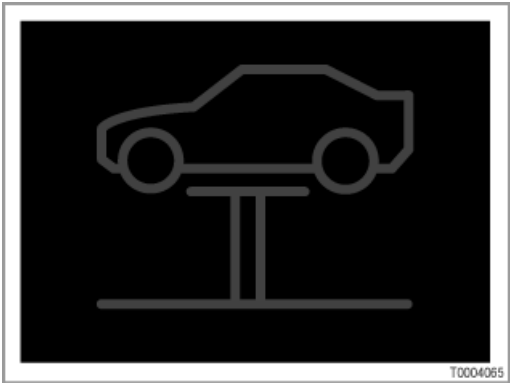
- Switch off and disconnect battery charger
- Turn off ignition.
For vehicles with ignition key: Ignition key in neutral position
Vehicles with ID transmitter: Remove ID transmitter from slot
For vehicles with Comfort Access: Secure terminal 30
- Disconnect negative battery lead
- Reconnect battery earth lead (to ensure bus activity)
- Observe a waiting period of 5–10 s
- Disconnect negative battery lead
- Observe a waiting period of approx. 1 minute
- Connect battery earth lead
Tightening torque: 61 21 1AZ
- Connect and switch on battery charger
- Switch on ignition.

2. With the diagnosis system:

- 03 Body
- Voltage supply
- Activate rest state
- Power-down command



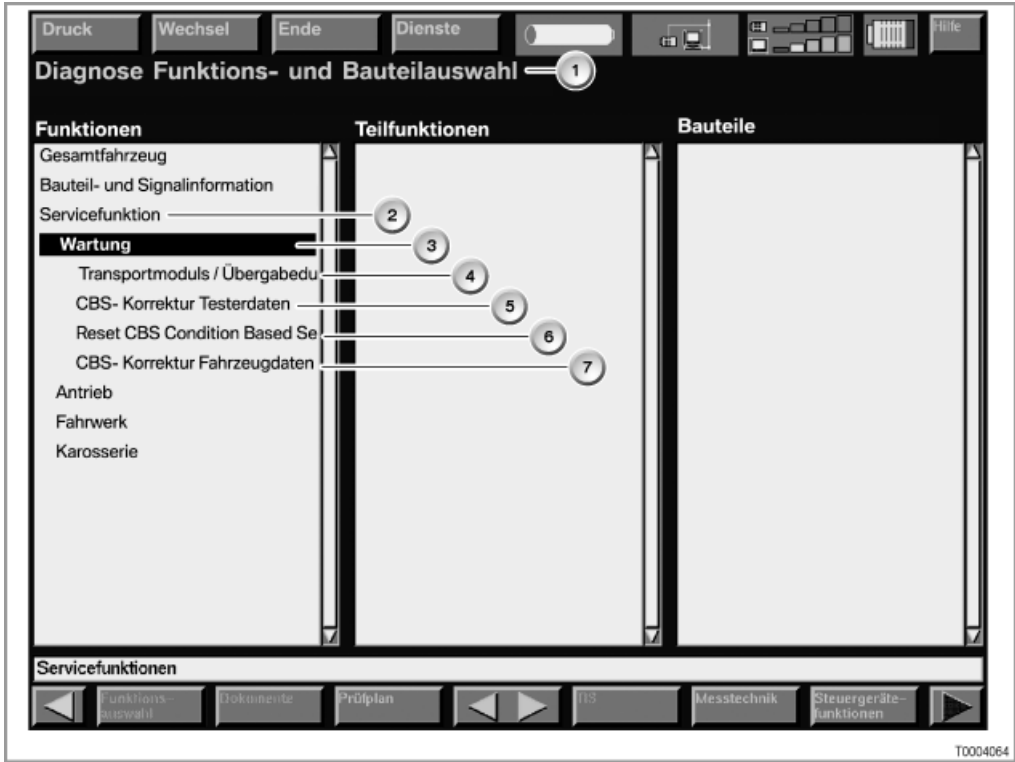
61 00 ... Diagnosis for Condition Based Service



Note: Red symbol for pre-delivery check
 The vehicle is coded at the end of line so that the red symbol for the pre-delivery check is shown in the Next Service indicator (same symbol as vehicle check).
 The symbol is a reminder to the Service staff that the pre-delivery check has not yet been carried out on this vehicle.

Note: Do not carry out a reset.
 Do **not** confuse this function with the "Vehicle check" scope of maintenance work. Do not run a reset with the KOMBI.

When executing the pre-delivery check with the "Transport mode / Pre-delivery check" service function: The symbol will be suppressed automatically after the service function has been executed.



Item	Explanation	Item	Explanation
1	Function and component selection	2	Service functions
3	Maintenance	4	Transport mode/pre-delivery check
5	CBS correction, tester data	6	Reset CBS Condition Based Service
7	CBS vehicle data correction		

4 service functions are available in the BMW diagnosis system for maintenance:

- Transport mode/pre-delivery check
- CBS correction, tester data
- Reset CBS
- CBS vehicle data correction

Service Function: Transport Mode/Pre-delivery check

In order to ensure that a vehicle can be handed over to the customer in proper condition, the "Transport mode/pre-delivery



check" service function must be performed.

The following positions are checked during the pre-delivery check:

- Deactivation of the transport mode.
- To determine the vehicle-specific vehicle performance per week an adaptation process is activated. Transport and immobilisation periods before vehicle delivery to the customer therefore do not have any effect on the customer-specific weekly distance travelled.

The weekly mileage/kilometrage is used to control escalation from "green" to "yellow" (approx. 4 weeks before "red") for maintenance scopes with remaining distances. It is the vehicle performance determined over the last 6 weeks which is taken into account.

- Encoding or deletion of the legally-specified intervals for the legally stipulated vehicle inspection and exhaust-gas test.
- Inputting the target dates for the legally stipulated vehicle inspection and exhaust-gas test (automatically or manually).

Automatically: by date entry of the first registration and the interval

Manually: by directly entering the target date

- Entry of local, service-related phone numbers, depending on vehicle equipment specification (e.g. BMW Group Mobile Service, BMW Hotline, customer's local dealer).

The country-specific phone numbers are displayed in the BMW diagnosis system as a note. When asked for input information the phone numbers can simply be read off.

- Information on initialising the TeleServices depending on the vehicle equipment.
- Checking and where necessary adjusting the on-board date for the vehicle.
- Entry of the date of the first registration of the vehicle.
- Clear diagnostic fault entries from fault memory.

Note: Reduction of input effort.

In order to minimise the input effort for the workshop, standardised data is saved on the BMW diagnosis system (for repeat use). The standardised data can be changed with the "CBS correction, tester data" service function.

Service Function: CBS correction, tester data

With the "Pre-delivery check" service function, data will automatically be stored in the vehicle. The standardised data can be changed with the "CBS correction, tester data" service function.

The following standardised data can be modified:

- Phone numbers:
 - BMW Group Mobile Service
 - BMW Hotline
 - Local dealer

The country-specific phone numbers are contained in the BMW diagnosis system as a note (to be read off when required for input). The phone numbers must be input with the international dialling code.

- Legally stipulated vehicle inspection (country-specific):
 - Encoding or deletion
 - Interval for calculating the target date

The target date is calculated on the basis of the date of the first registration.

- Legally stipulated exhaust-gas test (country-specific):
 - Encoding or deletion
 - Interval for calculating the target date

The target date is calculated on the basis of the date of the first registration.

Note: Automation after installation of the BMW diagnosis system.

If the pre-delivery check is being carried out for the first time, the standardised data will be defined automatically. It is therefore not necessary to enter the data separately.

Service Function: Reset CBS Condition Based Service

The scope of maintenance work can be reset with the "Reset CBS Condition Based Service" service function. Even when the availability is above 80 %. The reset via the BMW diagnosis system has the advantage that the on-board date is corrected automatically.

The individual maintenance scopes are displayed in the BMW diagnosis system with service counter and availability.

- The service counter is increased by one count on resetting. In new vehicles all service counters are set to "1".



The service counters are used in the Service Acceptance Module (SAM) to control the additional work for specific maintenance operations.

- On resetting the availability is set at 100%. The percentage availability is the wear value for the maintenance operation.

The greater the availability, the further away the next service.

0% means that the maintenance measure must be carried out.

Service Function: CBS vehicle data correction

Important! The data has been exceeded.

After carrying out this service function, it will no longer be possible to restore the previous status.

The service function "CBS vehicle data correction" is available if resetting has been carried out **unintentionally**. Thus the availability of a maintenance measure can be corrected to a value which corresponds more closely to the actual situation.

For this correction a date or kilometre reading is entered. This data is processed internally to give a percentage availability. Here, the BMW diagnosis system will only accept a value which is lower than the current status in the control unit. In addition, the service counter of the scope is automatically reduced by one counter during correction.

The entries in the service booklet are used to determine the actual availability. The most recent maintenance measure (kilometre reading and date) allows the reconstruction availability for the specific scope that corresponds more closely to the actual situation. This does not include the correction of the brake pad availability. The remaining brake pad thickness must be measured and entered (in millimetres).

Note: Reference for distance- and time-dependent maintenance scopes

On correction the availability depends on the distance-dependent and time-dependent calculation.



*Note:*

Depending on the vehicle and the equipment, the following flat rate unit items are available for programming/encoding:

- 61 00 710
- 61 00 720
- 61 00 730

*Note:*

- In order to avoid incorrect programming procedures and fault messages, it is essential when working with the ISTA/P programming system always to use the version.
- Battery voltage must not drop below **13.0 V** during programming.
Only use chargers* recommended by BMW for low voltage vehicle electrical system.

*Sourcing reference Workshop Equipment Catalogue

programming routine via ISTA/P:

- Connect the battery charger to the vehicle.
- Connect the programming system with the vehicle.
- Determine the action plan.
- Accept action plan with the control units to be programmed/encoded and enabled, if necessary or work through.
- Observe the reworking list!
- If applicable, connect the workshop system to the vehicle depending on the rework list, run the brief test and delete the fault memory.

Note:

A switch to the workshop system may not necessarily be required with the integration of the service functions and the "Delete fault memory" function in ISTA/P. Check the rework list accordingly!

- The information about programming the workshop system and the corresponding notes in the user documentation must be observed.



61 00 730 Encode/program control unit(s) (After vehicle test)

1 Encode/program control unit(s)

Prerequisite

Replacement of the control unit.



TECHNICAL INFORMATION

Use the most recent software version to prevent faults during programming/encoding.
The battery voltage must not fall below 13.0 V during programming.
Use only chargers for a low volt-vehicle electrical system that are recommended by BMW.



TECHNICAL INFORMATION

No high-voltage switch off is required in electric vehicles or hybrid vehicles for programming/encoding.
The high-voltage system will be automatically switched off by the programming system.

Exception:

BMW I01: Note Product and Measures Management Aftersales measure 55176388.

- Connect the battery charger to the vehicle.
- Connect the programming system with the vehicle.
- Determine the action plan.
- Accept and fully process the measures plan.
- If applicable, connect the workshop system to the vehicle, depending on the reworking list.
- Carry out vehicle test.
- Delete the fault memory.
- The information about programming the workshop system and the corresponding notes in the user documentation must be observed.
- Wait until programming/encoding has been completed.
- Disconnect the programming system from the vehicle.
- Disconnect the battery charger from the vehicle.



61 12 ... Information on intelligent battery sensor (IBS)

Notice! Do not connect the charger to the 12 V charging socket

The 12 V charging socket is supplied with voltage by the rear power distribution box via relay. This relay drops out after terminal 15 OFF. This means that a trickle charger connected at the 12 V charging socket will be disconnected from the battery. Only charge the battery via the jump start terminal point. Only then can the voltage supply be registered by the vehicle.

Warning! Danger of destruction in event of mechanical strain

- Do not introduce any additional connections at the battery negative terminal.
- Do not modify the grounding cable. The ground cable also serves heat dissipation.
- Do not establish any connection between the IBS and the sensor screw.
- Do not use force when disconnecting the pole shoe from the battery terminal:
 - Do not pull on the ground cable.
 - Do not place any tools under the IBS to lever off the pole shoe.
- Do not use IBS connections as levers.
- Use a torque wrench and set tightening torque in accordance with repair instructions.
- Do not release or tighten down sensor screw (Torx screw).
- Avoid contact between IBS and ground.

Warning! Danger of destruction to IBS and wiring upon battery replacement

- The IBS and wiring can be destroyed by mechanical strain upon battery replacement. Therefore avoid mechanical strain.
- The size (capacity) of the battery required for the car is coded in the Car Access System (CAS).
- Use the battery size (capacity) installed as standard upon battery replacement.
- Recode the Car Access System (CAS) when installing a battery with a different capacity.
- Register battery replacement via Service functions in diagnosis system.
- Delete fault code entries in the Digital Engine Electronics (DME) associated with battery replacement.
- Always proceed in accordance with the repair instructions.

Note: Battery draining possible in spite of the intelligent battery sensor IBS being fault-free.

- A battery can be drained (e.g. with lights or radio switched on) even when the IBS functions perfectly in conjunction with power management.
- **For this reason, only exchange the IBS when there is a corresponding fault code entry!**



61 00 ... Notes for disconnecting and connecting the vehicle battery

Observe safety informations for handling vehicle battery.

Before disconnecting vehicle battery:

Turn off the ignition and other electrical loads/consumers to prevent sparking when reconnecting.

Note:

If the ignition is not switched off when the vehicle battery is disconnected, fault memories may be set in some control units.

Attention!

- There is a danger of mixing up battery cables: if the positive battery cable and battery earth lead are the same colour and you are in doubt, follow the polarity to the vehicle battery, then mark and cover the leads
- The on-board computer and clock may lose your data.

General notes on disconnecting the vehicle battery:

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- Disconnect terminal of battery earth lead from the battery. Cover battery negative terminal(s) and secure.
- Disconnect both battery earth leads in version with auxiliary battery. Cover battery negative terminal(s) and secure.
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the vehicle battery is connected.
- When installing battery terminal: Tightening torque 61 21 1AZ.

Only lead AGM battery:

- On vehicles with IBS at negative battery terminal:
Do not under any circumstances pull/lever off pole shoes by force.
Do not under any circumstances release the hexagon socket screw of the IBS.

Note the following after having connected the vehicle battery:

Attention!

The scope of application of some systems may be restricted after an open circuit.

Personal Profiles may also be lost.

Settings or activations must be carried out, depending on the equipment specification.

For example:

- Activate slide/tilt sunroof, if necessary
- Activate power window, if necessary

Refer to the diagnosis system for further vehicle-specific information.



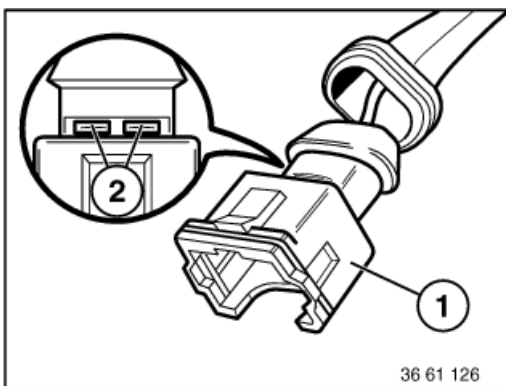


Special tools required:

- 61 0 300
- 61 0 400
- 61 1 100

Abbreviations of contacts and what they mean:

ELA	Strand seal
D 1.5 / 2.5 / 3.5	Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter
MDK	Miniature double flat spring contact
JPT	Junior Power timer
DFK	Double flat spring contacts
Elo	Electronic contacts
Elo Power	Electronic contacts for heavy load
MQS	Micro Quadlock system
MPQ	Micro Power Quadlock
MLK	Mini laminated contact
SLK	Sensor laminated contact
LSK	Load current contact
MLK	Mini laminated contact
Mcon	Multi contact



Important!

The contacts can be changed on ultrasonically welded connectors (1).

Ultrasonically welded connectors (1) must be replaced completely.

Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.



Note:

Special tools referred to in the repair instructions below are contained in the following special tool sets:

- Unlocking and pressing-off tool 61 1 150
is replaced as of 09/2005 by 61 0 300 (BMW) and 61 0 400 (MINI)
- Release and pressing-off tool 61 1 100 (engine)



Repair instructions for opening connector housings and removing contacts of different connector systems:

Connector system D 1.5/D 2.5:

- Circular connectors, 7- or 8-pin, system D 2.5
- Circular connectors, 13-pin, system D 2.5
- Circular connectors, 20-pin, system D 2.5
- Circular connectors, 4-, 7-, 10-, 12- or 25-pin, system D 1.5/D 2.5
- In-line connectors, 15-pin, system D 2.5
- In-line connectors, 8-, 12-pin, system D 2.5
- In-line connectors, 30-pin, system D 2.5
- In-line connectors, 20-pin, system D 2.5

Connector system JPT/MDK/DFK:

- In-line connectors, 2-pin, System JPT ELA
- In-line plugs, 2-pin, System MDK 3 plus 2.8
- In-line plugs, 4-pin, System DFK ELA

Connector system Elo/Elo Power:

- Inline plugs, 4-, 10-pin, System Elo
- In-line connectors, 6- to 50-pin, System Elo
- Inline plugs, 3-, 6-pin, System Elo-Power 2.8

Connector system LSK:

- Connector housing LSK contact

Connector system MQS/MPQ:

- Inline connectors, 6-, 8-pin, System MQS
- Inline plugs, 2-pin, System MPQ 2.8
- Control unit connectors, 25-, 35-, 55-, 83-, 88-pin
- In-line plugs, 24-pin, Hybrid System MQS/MPQ
- Socket housing 42-, 43-pin, Hybrid System MQS / MPQ
- Socket housings 2x21-, 2x27-pin, Hybrid System MQS/MPQ, Elo/Elo Power
- In-line connectors, 30-pin, Hybrid System MQS/MPQ
- Socket housings, 5-, 8-pin, System MQS/MPQ
- Socket housing (radio connector), Hybrid System MQS/MPQ

For connector contact systems not listed, refer to Service Information:

SI 2 05 05 217

SI 2 05 06 294

SI 2 03 08 440

SI 2 08 06 312

SI 2 02 08 439

SI 2 01 08 438





**Important!**

To avoid damage when handling optical fibres, comply with the following points:

- The minimum permitted bending radius is 25 mm
- Do not subject optical fibres to compressive and tensile load
- Protect optical fibres against the effects of heat ≥ 85 °C (e.g. during welding work, drying work with infrared beams or hot air blower)
- Fibre-optic cables are permitted to show only one junction point (bridge), replace fibre-optic cables if necessary

*Note:*

The optical fibres are coloured differently as follows:

- Green = **MOST** (**M**edia **O**riented **S**ystems **T**ransport) optical fibre
- Yellow = **ISIS** (**I**ntelligent **S**afety and **I**ntegration **S**ystem) optical fibre
- Orange=repair fibre-optic cables

Follow notes for processing cables and optical fibres.



**Warning!**

Only used a high pressure cleaner approved by BMW!

Only specially trained persons of 16 years of age or older may work with the high pressure cleaner.

Check the high pressure cleaner and electrical wiring for visible damage.

Only use at a suitable location.

**Attention!**

Pay attention to following hazard warnings:

- Danger of injury due to water jet
- Contact with hazardous substances in spray
- Risk of skidding on wet floor
- Risk of stumbling due to hoses and cables
- Comply with notes and instructions on handling cleaning agents !
- Risk of scalding when cleaning with hot water.
- On electric or hybrid cars, the safety instructions for handling with hybrid cars are to be complied with.

**Warning!**

The following personal protective equipment is to be used:

- Safety goggles/face guard
- Suitable gloves
- Apron
- Rubber boots
- Ear protectors
- Safety shoes

**Attention!**

Notes on washing a vehicle with a high pressure cleaner:

- Do not wash directly on gaskets and control units during engine washes.
- A minimum distance of 30 cm must be adhered to for tyres and tyre valves.
- A minimum distance of 30 cm must be adhered to for the soft top and painted parts.
- Do not use if engine is still hot.
- Do not exceed maximum water temperature of 60 degrees.
- Do not spray directly onto cameras/sensors.





Attention!

- For your own safety, we recommend that you do not wash on the high-voltage components in electric or hybrid vehicles.





The following applies in general:

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies:

Shielded lines

Interference radiation and interference resistance can lead to neutral zones at contact points in the shielding. Consequently, distinctions have to be drawn between the following types:

Coaxial lines

- Shielded coaxial cables RTK031 may only be repaired with special crimping tool.
- For aerial lines only the bushing contact may be repaired.
- RG174 Lines and the bushing contact may not be repaired.

CVBS lines

- CVBS cables may not be repaired.
- CVBS cables must be replaced in their entirety.

HSD lines

- HSD cables may not be repaired.
- HSD cables must be replaced in their entirety.

Optical fibre cable:

Note:

Fibre-optic cables are coloured differently as follows:

- Green = **MOST** (Media Oriented Systems Transport) optical fibres
- Yellow = **ISIS** (Intelligent Safety and Integration System) optical fibres
- Orange=repair fibre-optic cables

Attention!

- Fibre-optic cables are permitted to show only one junction point (bridge), replace fibre-optic cables if necessary
- Smallest permissible bending radius is 25 mm
- Avoid effects of heat $\geq 85^\circ$

Treating cables and optical fibres

FlexRay (twisted cables)

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

Note:

- FlexRay lines may only reveal one separation point (bridge) per line



- Flexray lines may only reveal one separation point (bridge); renew complete line if necessary.
- If possible, maintain twisted cable after repair.
- After repairs, twist cables as close as possible to the connector/separation point.
- Twisting must be as symmetrical as possible.

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables

Replacing wiring harnesses

Repair wiring harnesses mainly cover the full equipment of the vehicle. If certain optional equipment is not installed in the vehicle, note the following:

- If necessary, secure the remaining connectors.
- If necessary, seal the remaining connectors outside the vehicle interior, for example, with butyl tape in such a way that moisture ingress can be eliminated permanently.

Note:

Repair wiring harnesses can be equipped with an **additional socket housing** (e.g. 30-pin), **which was not provided on the previous vehicle-side wiring harness**. This socket housing also cannot be found in the wiring diagram.

Procedure

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **in the vehicle interior** (in the footwell, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.
- Alternatively, a suitable pin housing can be fitted on the vehicle-side wiring harness and connected to the additional socket housing.

However, this is permitted only if the following conditions are met:

- Carpets must not protrude visibly or become deformed due to the installation of the additional plug connection.
- It must be possible to install the adjacent components (for example, trims, trim panels, etc.) correctly after installing the additional plug connection.
- All the attachment points of the adjacent components (for example, trims, trim panels, etc.) must engage correctly.
- There must be no rattling noise due to the installation of the additional plug connection.
- The additional plug connection must not damage the adjacent components/wiring harnesses, etc..

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **outside the vehicle interior** (in the wheel arch, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.



- **Using the additional socket housing is not permitted with a separation point outside the vehicle interior.**



12 00 ... Notes/information on start assistance (jump starting)

Do not start the engine with help of starting sprays.

Preparation:

Conform with the following when starting the engine with a jump starting cable.

- Ensure that the jump starting cable wires are of appropriate cross-section size.
- Only use fuse-protected jump starting cables.
- Check whether the current-supplying battery has 12 V voltage.
- If the engine is started from the battery of another vehicle, ensure that there is no contact between the bodies of both vehicles.

Important!

Never touch electrically live ignition system components: high voltage - danger of injury!

If the battery in the vehicle supplying power is weak, start the engine of this vehicle and let it run at idling speed.

Operation:

It is essential to conform to the procedures so as to avoid injury to persons or damage to parts.

- Automatic transmission: select drive position "P", apply parking brake.
- Manual transmission: move gear lever to neutral position, apply parking brake.
- Ensure that the jump leads cannot get caught in rotating parts, e.g. fan.
- First connect both positive poles of the batteries with one jump starting cable (red).
- Use the battery positive terminal in the engine compartment for vehicles with the battery in the luggage compartment.
- Then use the second jump starting cable (black) to connect the negative post of the current-supplying battery with the earth/ground point (not the negative pole or the body) of the vehicle to be started.

Important!

Do not connect the second jump starting cable (black) with the negative pole of the battery in the vehicle to be started. Produced gas could be ignited by sparks.

Risk of explosion!

After the engine of the vehicle to be started has fired, first disconnect the jump starting cable between the negative pole and the earth/ground point. Then remove the starting cable from the positive poles.



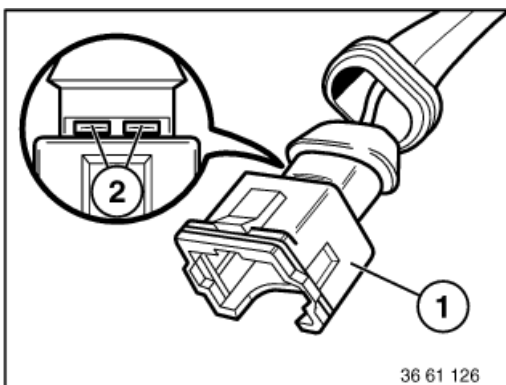


Special tools required:

- 61 0 300
- 61 0 400
- 61 1 100
- 61 1 150

Abbreviations of contacts and what they mean:

ELA	Strand seal
D 1.5 / 2.5 / 3.5	Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter
MDK	Miniature double flat spring contact
JPT	Junior Power timer
DFK	Double flat spring contacts
Elo	Electronic contacts
Elo Power	Electronic contacts for heavy load
MQS	Micro Quadlock system
MPQ	Micro Power Quadlock
MLK	Mini laminated contact
SLK	Sensor laminated contact
MLK	Mini laminated contact
Mcon	Multi contact



Important!

The contacts can be changed on ultrasonically welded plugs (1).
Ultrasonically welded plugs (1) must be replaced completely.
Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.



Note:

Special tools referred to in the repair instructions below are contained in the following special tool kits:

- Release and press-out tool 61 1 150
is replaced from 09/2005 by 61 0 300 (BMW) and 61 0 400 (MINI)
- Release and press-out tool 61 1 100 (engine)



Repair instructions for opening plug housings and removing contacts of different plug systems:

Plug system D 1.5/D 2.5:

- Circular plugs, 7-, 8-pin, System D 2.5
- Circular plugs, 13-pin, System D 2.5
- Circular plugs, 20-pin, System D 2.5
- Circular plugs, 4-, 7-, 10-, 12-, 25-pin, System D 1.5/D 2.5
- In-line plugs, 15-pin, System D 2.5
- In-line plugs, 8-, 12-pin, System D 2.5
- In-line plugs, 30-pin, System D 2.5
- In-line plugs, 20-pin, System D 2.5

Plug system JPT/MDK/DFK:

- In-line plugs, 2-pin, System JPT ELA
- In-line plugs, 2-pin, System MDK 3plus 2.8
- In-line plugs, 4-pin, System DFK ELA

Plug system Elo/Elo-Power:

- In-line plugs, 4-, 10-pin, System Elo
- In-line plugs, 6- to 50-pin, System Elo
- In-line plugs, 3-, 6-pin, System Elo-Power 2.8

Plug system MQS/MPQ:

- In-line plugs, 6-, 8-pin, System MQS
- In-line plugs, 2-pin, System MPQ 2.8
- Control unit plugs, 25-, 35-, 55-, 83-, 88-pin
- In-line plugs, 24-pin, Hybrid System MQS/MPQ
- Socket housing 42-, 43-pin, Hybrid System MQS / MPQ
- Socket housings 2x21-, 2x27-pin, Hybrid System MQS/MPQ, Elo/Elo-Power
- In-line plugs, 30-pin, Hybrid System MQS/MPQ
- Socket housings, 5-, 8-pin, System MQS/MPQ
- Socket housing (radio plug), Hybrid System MQS/MPQ

For plug contact systems not listed, refer to Service Information:

SI 2 05 05 217

SI 2 05 06 294

SI 2 03 08 440

SI 2 08 06 312

SI 2 02 08 439

SI 2 01 08 438



61 00 ... **Repairing airbag cables**

Important!

Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations for handling components of airbag system.

Instructions for disconnecting and connecting battery.

In event of non-visible damage to wiring harness:

Disconnect plug connection on airbag module or on adapter plug. It is absolutely vital to disconnect the contacts in succession as there is a risk of mixing up (similar parts)! Cut through one cable after the other at an appropriate position, do not under any circumstances cut through both cables at the same time. Insulate cables remaining in wiring harness with insulating tape. Now disconnect plug connection on airbag control unit. Unpin contacts. Cut through one cable after the other at an appropriate position and insulate with insulating tape, do not under any circumstances cut through both cables at the same time. Pin contacts of repair cable for airbag control unit in control unit plug, assignment of repair cables is relevant. Lay repair cable in vehicle parallel to existing airbag lead. Now pin in contacts for airbag control unit or contacts of adapter plug, assignment of repair cables is relevant. Cut off excess length of repair cable in proximity (visible area) of airbag module or of adapter plug. Twist open cables. With the butt connectors and heat-shrink tubings in the Electronic Parts Catalogue (EPC), reconnect the cables with the same cable colours. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (heat-shrink tubing) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

Cutting off and insulating cables.

Repairing a plug connection using butt connectors.

Installing and removing contacts.

In event of visible damage:

Expose cable at damaged areas. Cut through one cable after the other at an appropriate position and insulate cables no longer required in wiring harness with insulating tape, do not under any circumstances cut through both cables at the same time. Now, depending on the scope of work, unpin contacts either on airbag control unit/airbag module or on adapter plug. Cut off unpinned cables. Insulate cables remaining in wiring harness with insulating tape. Now pin in contacts of repair cable, assignment of repair cables is relevant. Lay repair cable in vehicle parallel to existing airbag lead up to separation point. Cut off excess length of repair cable. Twist open cables. Connect cables with butt connectors and heat-shrink tubings in Electronic Parts Catalogue (EPC), assignment of repair cables is relevant. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (heat-shrink tubing) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

Cutting off and insulating cables.

Repairing a plug connection using connectors.

Installing and removing contacts.



61 00 ... **Repairing airbag cables**

Important!

Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations for handling components of airbag system.

Instructions for disconnecting and connecting battery.

In event of non-visible damage to wiring harness:

Disconnect plug connection on airbag module or on adapter plug. It is absolutely vital to disconnect the contacts in succession as there is a risk of mixing up (similar parts)! Cut through one cable after the other at an appropriate position, do not under any circumstances cut through both cables at the same time. Insulate cables remaining in wiring harness with insulating tape. Now disconnect plug connection on airbag control unit. Unpin contacts. Cut through one cable after the other at an appropriate position and insulate with insulating tape, do not under any circumstances cut through both cables at the same time. Pin contacts of repair cable for airbag control unit in control unit plug, assignment of repair cables is relevant. Lay repair cable in vehicle parallel to existing airbag lead. Now pin in contacts for airbag control unit or contacts of adapter plug, assignment of repair cables is relevant. Cut off excess length of repair cable in proximity (visible area) of airbag module or of adapter plug. Twist open cables. With the butt connectors and heat-shrink tubings in the Electronic Parts Catalogue (EPC), reconnect the cables with the same cable colours. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (heat-shrink tubing) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

Cutting off and insulating cables.

Repairing a plug connection using butt connectors.

Installing and removing contacts.

In event of visible damage:

Expose cable at damaged areas. Cut through one cable after the other at an appropriate position and insulate cables no longer required in wiring harness with insulating tape, do not under any circumstances cut through both cables at the same time. Now, depending on the scope of work, unpin contacts either on airbag control unit/airbag module or on adapter plug. Cut off unpinned cables. Insulate cables remaining in wiring harness with insulating tape. Now pin in contacts of repair cable, assignment of repair cables is relevant. Lay repair cable in vehicle parallel to existing airbag lead up to separation point. Cut off excess length of repair cable. Twist open cables. Connect cables with butt connectors and heat-shrink tubings in Electronic Parts Catalogue (EPC), assignment of repair cables is relevant. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (heat-shrink tubing) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

Cutting off and insulating cables.

Repairing a plug connection using connectors.

Installing and removing contacts.



00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



Warning!

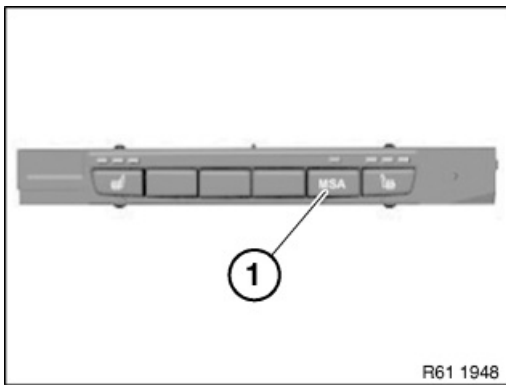
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

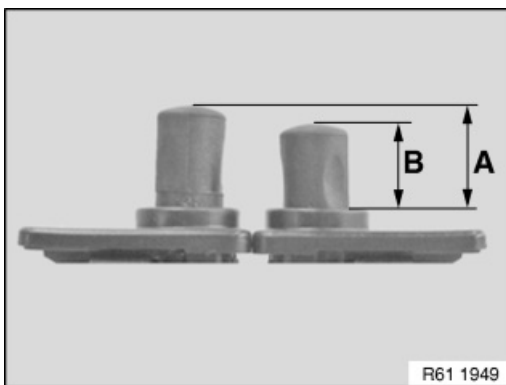
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode
A = 10 mm
 - Basic setting (engine hood/bonnet open)
B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



When working with diagnosis tools:

- Observe instructions in diagnosis tool





Note:

For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) Service Information (bulletin) 61 01 07 335
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) Service Information (bulletin) 61 01 10 629



61 00 ... Safety information on handling hybrid cars

1. *Qualification:*

All repair work on high-voltage components may **only be performed by specially trained personnel** (qualification: Work on high-voltage inherently safe vehicles) must be performed by qualified technicians. Each hybrid car requires additional vehicle specific training with training achievement controls.

Required training is offered by the BMW Training Academy.

2. *Identification:*

Observe **warning notices** on high-voltage components. When replacing individual high-voltage components, check if warning stickers are present. Independently attaching warnings is only allowed on the locations provided for them. Use only approved and appropriately identified original new parts.

3. *Rules of conduct/protective measures:*

- Note operating instructions for handling high-voltage battery units.
- Do not under any circumstances touch open high-voltage cables and high-voltage components on damaged vehicle before shutting down the high-voltage electrical system.
- In the event of damage (mechanical, thermal) transition metal oxides, carbon, electrolyte solvents and their products of decomposition may be released.
Suitable acid-resistant protective clothing/equipment must therefore be used when handling the vehicle!

- Hand protection: Gloves
- Eye protection: Safety goggles

Damaged high-voltage battery units must be stored in an acid-resistant pan in a location in the open that is protected against the weather (sun, rain) and secured against unauthorised access. Do not inhale escaping gasses.

- Prevent escaping substances from entering drains, pits and the sewer system.
- Collect any material that is discharged and have it disposed of according to the work instruction, wear acid-resistant protective clothing when doing so.
- Notify the fire brigade if fire breaks out, clear the area immediately and make accident scene safe. Attempt to extinguish the fire without putting persons in danger (suitable extinguishant: water and water foam).
- A cut 2nd emergency separation point must be repaired with a butt connector.

4. *Measures before starting work:*

- Each job on the vehicle must be assigned by appropriately trained personnel. Before work is started, this electrician must place the vehicle in the operating condition required to perform the relevant activity. The qualified personnel's instructions and directions absolutely must be followed. **No work may be carried out without this qualified personnel being consulted first.**
- It is **not** permitted to work on the high voltage system or on high voltage components while the engine is running.
- The readiness to drive must be ended before shutting off the voltage of the high-voltage system. The readiness to drive is ended when the driver is absent only under the following conditions:
 1. seat belt buckle unlocked **and**
 2. the driver's door is open **and**
 3. no brake activated **and**
 4. the accelerator pedal is not activated **and**
 5. speed < 3 km/h (2 mph)
- Work on live high-voltage components is expressly prohibited. Before each operation on the high-voltage system, the system must be isolated from the power supply by qualified personnel (high-voltage safety connector Off) and secured against unauthorised recommissioning (padlock).
- After each deactivation of the high-voltage system, it is essential to observe a **waiting period** of at least **10 seconds** prior to further work.
- Before beginning work, it is mandatory to check that the equipment is de-energised and is protected against being energised again.
Work is only permitted to begin if:
 1. Corresponding display in the KOMBI **High-voltage system deactivated** orWhen a high-voltage warning is active (indicator light, Check Control, etc.), it is essential to determine and eliminate the cause of this warning via the diagnosis system before continuing with any other work.
If it cannot be definitively established that the equipment is de-energised, work is not permitted to begin. **Danger to life!** Before work begins, a qualified electrician (1000 V AC) must verify that the



system is de-energised using appropriate measuring devices and procedures.

=> In this case, Technical Support must be contacted!

- Do not perform any work on the vehicle while it is charging. Before starting work, disconnect the charging cable from the vehicle.
Battery charging may result in heating of the high-voltage battery unit. This heating may lead to sporadic launches of the electric fan (switch-on request from the electric fan). Therefore, work in the vicinity of the electric fan during the charging procedure is prohibited. Ensure freedom of movement of the battery charge lines in the vicinity of the electric fan.

5. *Measures during/after activities:*

- Identifiable mechanical damage to or tampering with high-voltage components must be reported immediately to the qualified personnel in charge.
- When carrying out any work on the high-voltage system, it is prohibited to drive externally all the drivetrain components (wheels, gearbox, drive shafts, etc.).
- *E72 only:* When the "Power Electronic Box Cover" is removed, the high-voltage system is not permitted to be activated. The high-voltage service disconnect must only be used when the "Power Electronics Box Cover" is completely installed.
- High-voltage cables (orange coating) and their connectors and stop parts **may not** be repaired. If damaged, a cable must always be replaced completely.
- When working in the vicinity of high-voltage components (identified accordingly with warning stickers and orange-coloured coating), protect these components against damage.
- The specified work steps in the repair instructions must be adhered to exactly.
- High-voltage components and their holders must be screwed/bolted to the defined tightening torque. Tightening torques and tightening specifications must be observed.
- Connecting high-voltage components to body ground is crucial to safety for reasons of equipotential bonding. For this reason, it is prohibited to operate any high-voltage components without them being correctly connected to body ground. The measurements (insulation/potential equalisation measurement) are performed automatically by the vehicle. Manual measurement is not therefore necessary.
For a correct earthing connection, the retaining elements of high-voltage components must not be painted. Follow further painting notes.
- Removed high-voltage battery units must be stored in a manner that protects them from misuse and damage.
- Damaged or warning stickers that are no longer legible on high-voltage components must always be replaced.

6. *Potential compensation:*

Equipotential bonding lines, high-voltage cables and the battery negative lead to the EME are fitted with safety screws.

- Clean contact faces and have then checked by a second person.
- Tighten down screws/bolts to specified torque.
- Have tightening torque checked by a second person.
- Both persons must document that the work has been carried out correctly in the vehicle records.



61 00 ... **Safety instructions for handling vehicle battery**

Do not allow any battery acid to come into contact with the eyes, the skin or clothing. Therefore wear protective clothing, gloves and eye protection.

Do not tilt the battery, acid may emerge from the vent hole.

If acid is splashed into the eyes, rinse them immediately for several minutes with clear water. You must then consult a doctor without delay.

If acid is splashed onto the skin or clothing, neutralise it immediately with a soap solution and rinse with lots of water.

Seek medical attention immediately if battery acid is accidentally swallowed.

Strictly no flames, sparks, naked light or smoking!

A highly explosive detonating gas is created when batteries are charged. The rooms where charging is carried out must therefore always be well ventilated.

Avoid the formation of sparks when handling cables, wiring and electrical devices.

Turn the ignition lock to the 0 position before disconnecting or connecting the battery.

Do not place tools or any similar object on the battery (danger of short circuit and explosion hazard!).



61 13 ... Socket housing (radio connector), Hybrid System MQS/MPQ



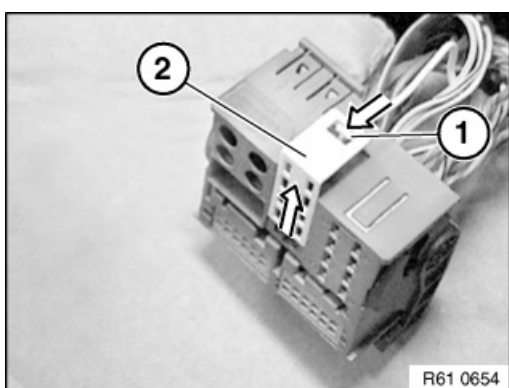
Special tools required:

- 61 0 314



Manufactured by AMP: The following contact types without strand sealing can be fitted in the connector housings:

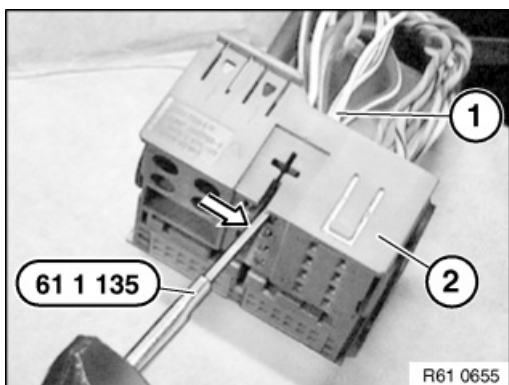
- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)



Removing MPQ contacts from radio connector:

Press lock (1) in direction of arrow.

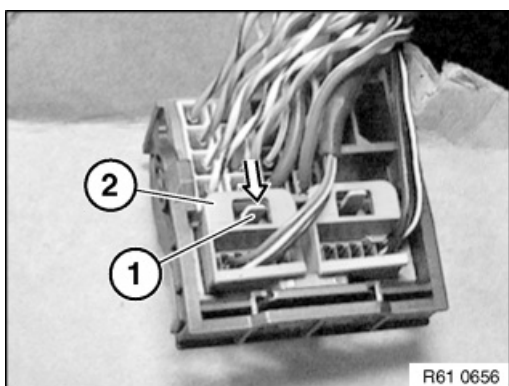
Detach secondary lock (2) from radio plug.



Feed special tool 61 0 314 (61 1 135) past side of contact.

Press special tool 61 0 314 (61 1 135) in direction of arrow.

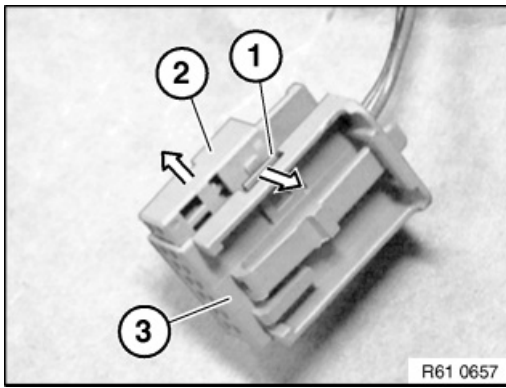
Pull wire (1) with socket contact out of radio connector (2).



Removing MQS contacts from contact carrier:

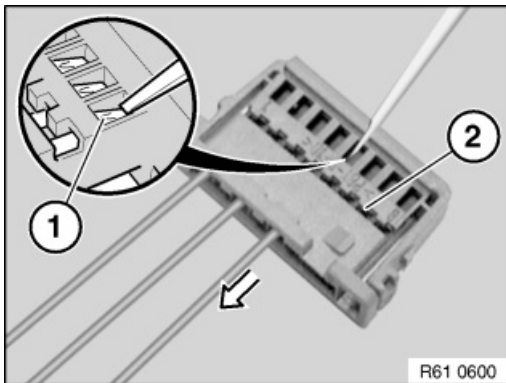
Press lock (1) in direction of arrow and pull housing (2) out of radio connector.





Press lock (1) in direction of arrow. Pull contact carrier (2) out of housing (3). *Note:*

When the contact carrier is pulled out, the secondary locks of the socket contacts are raised.

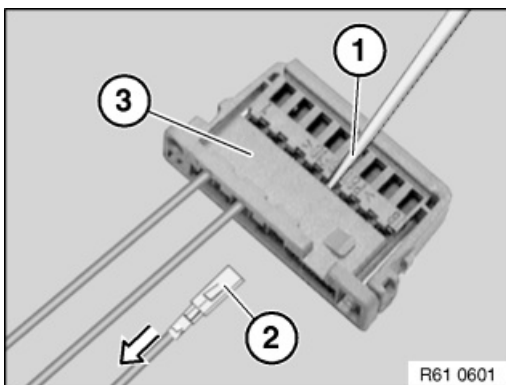


Note:

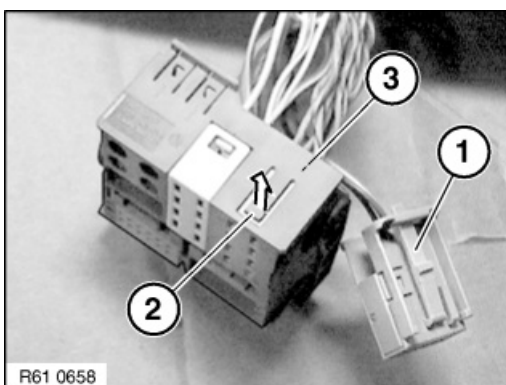
Schematic diagram shows the 8-pin socket housing by way of example.

Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

Pull wire with socket contact in direction of arrow as far as secondary lock (2).



Hold down retaining hook in secondary lock (1) again. Pull wire with socket contact (2) out of contact carrier (3).



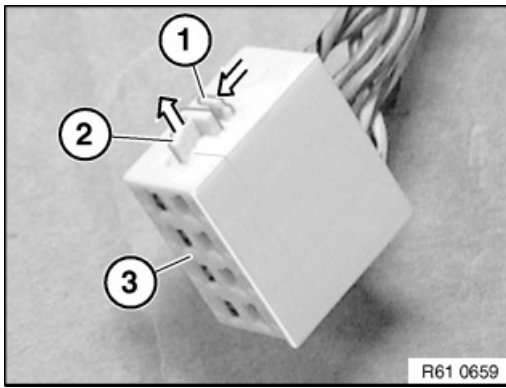
Removing MPQ contacts from contact carrier:

Remove contact carrier (1) with MQS contacts from radio connector.

Raise lock (2) on radio connector.

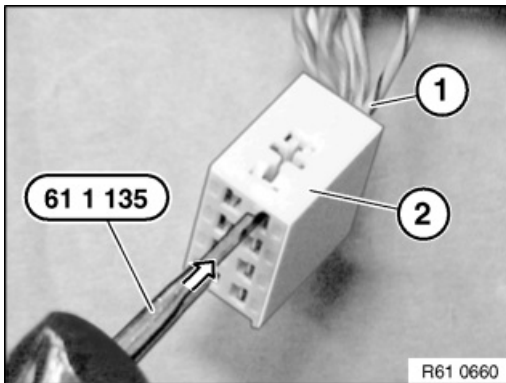
Pull contact carrier (3) out of radio connector.





Press lock (1) in direction of arrow.

Pull secondary lock (2) in direction of arrow completely out of contact carrier (3).



Press special tool 61 0 314 (61 1 135) on inside of contact into contact carrier (2).

Pull wire with socket contact (1) out of contact carrier (2).



61 13 ... Socket housing 42-, 43-, 46-pin, Hybrid System MQS / MPQ



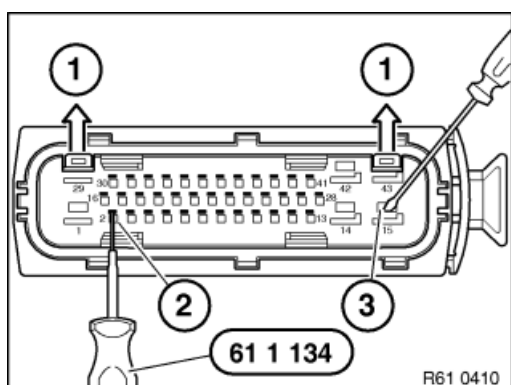
Special tools required:

- 61 0 312



Manufactured by AMP: The following contact types without strand sealing can be fitted in the socket housings:

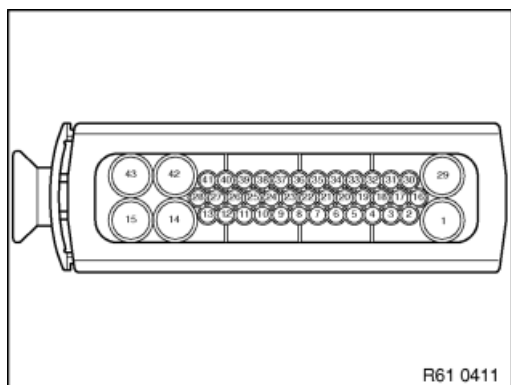
- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)



Open secondary locks (1) on socket housing.

Press back retaining hook of MQS contacts (2) with special tool 61 0 312 61 1 134 and pull out cable with contact.

Press back retaining hook of MPQ contacts (3) with screwdriver and pull out cable with contact.



Installation note:

Bend open retaining hook of contacts gently before inserting into connector housing.

For installation of contacts, observe chamber numbers on reverse side of socket housing.



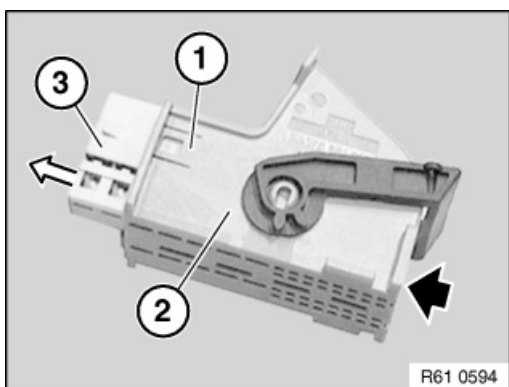


Manufactured by AMP: The following contact types without strand sealing can be fitted in the socket housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)

Manufactured by Siemens: The following contact types without strand sealing can be fitted in the socket housings:

- Elo (electrical contact)
- Elo Power 2.8 mm width (electrical contact for heavy loads)
- Elo Power 5.2 mm width (electrical contact for heavy loads)



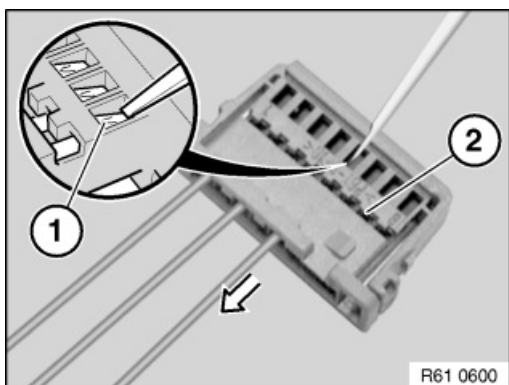
Raise lock (1) on housing (2).

Push contact carrier (3) from rear out of housing.

Note:

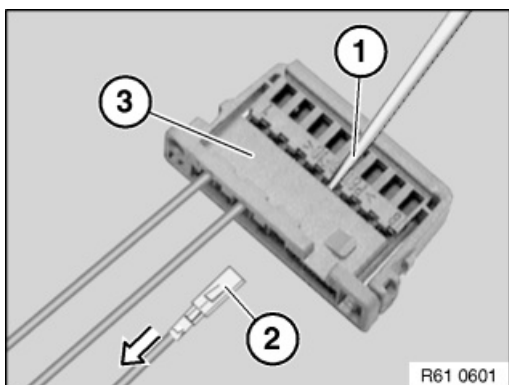
The second contact carrier is pushed out in the same way.

Pushing out the contact carrier releases the secondary locks of the socket contacts.



Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

Pull wire with socket contact in direction of arrow as far as secondary lock (2).



Hold down retaining hook in secondary lock (1) again and pull cable with socket contact (2) completely out of contact carrier (3).

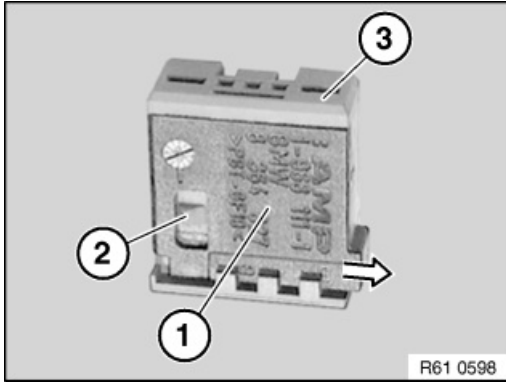


61 13 ... Socket housings, 5-pin, 8-pin, System MQS/MPQ



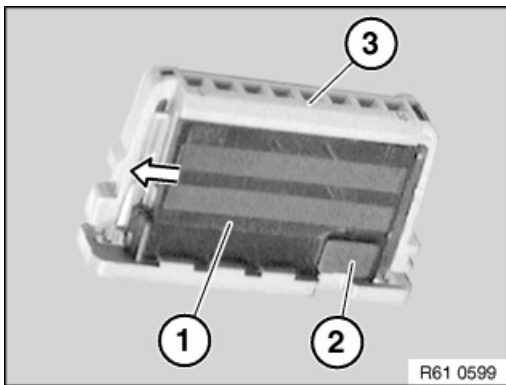
Manufactured by AMP: The following contact types without strand sealing can be fitted in the connector housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)



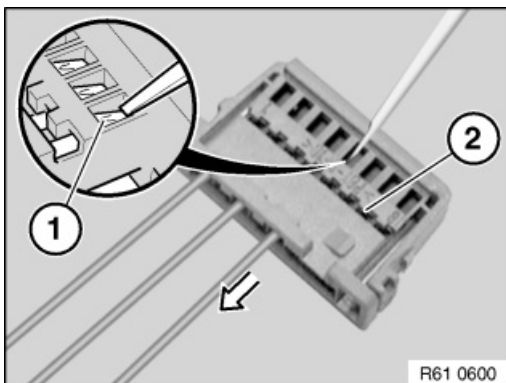
Socket housing, 5-pin (Hybrid System MQS/MPQ)

Raise fastener (1) over retaining lug (2) and pull off from contact carrier (3).



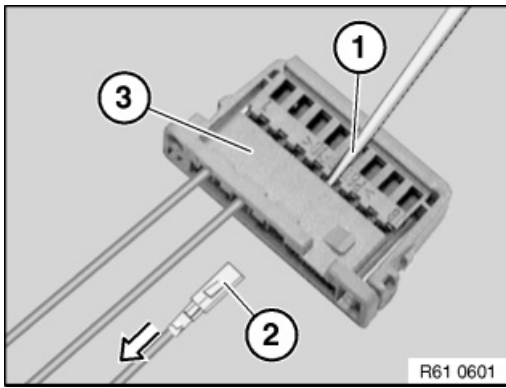
Socket housing, 8-pin (MQS):

Raise fastener (1) over retaining lug (2) and pull off from contact carrier (3).



Hold down retaining hook (1) of contact and pull cable with contact as far as secondary lock (2).





Hold down retaining hook in secondary lock (1) again and pull cable with contact (2) completely out of contact carrier (3).



61 13 ... Treating cables and optical fibres



Special tools required:

- 61 4 320
- 61 0 200



Note:

Special tools referred to in the repair instructions below are contained in the following special tool sets:

Repair range for vehicle electrical system	SI 2 04 07 341
Crimping set with pliers for optical fibres, Micro Power Quadlock (MPQ), Micro Quadlock System (MQS) contacts and universal crimping head	61 4 320 61 0 200

Subject of repair instructions

- Special tools for wiring harness repairs
 - Cutting cables to length and strip insulation
 - Crimping stop parts (contacts)
 - Butt connector for repairing a plug connection
 - Comb connector for retrofitting/repairs
 - Cutting to length and stripping insulation from optical fibres
- Crimping optical fibres



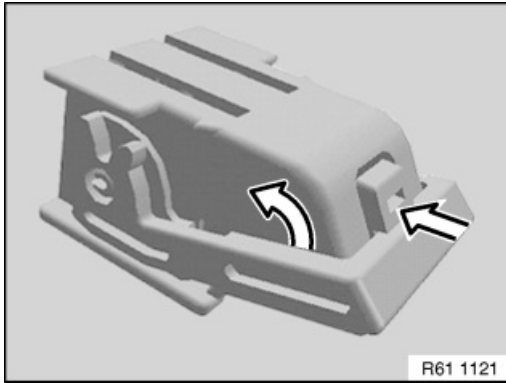
61 13 ... Unlocking and disconnecting different plug connections



Note:

The document describes unlocking and disconnecting different types of plug connections.

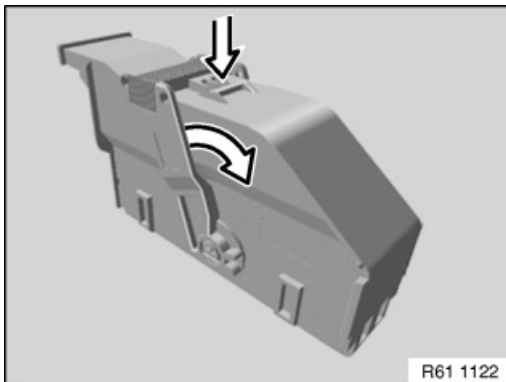
Differences in the details of the size and shape of the plug connections are possible.



1.

Press lock and open release clip in direction of arrow.

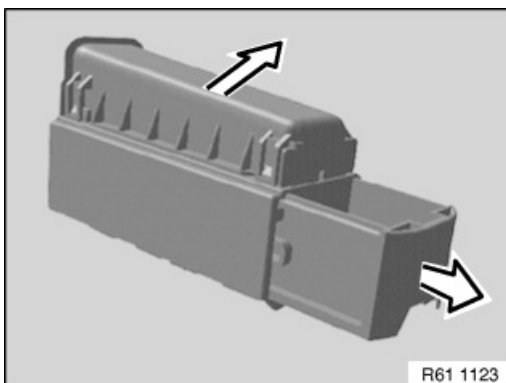
Disconnect plug connection.



2.

Press lock and open release clip in direction of arrow.

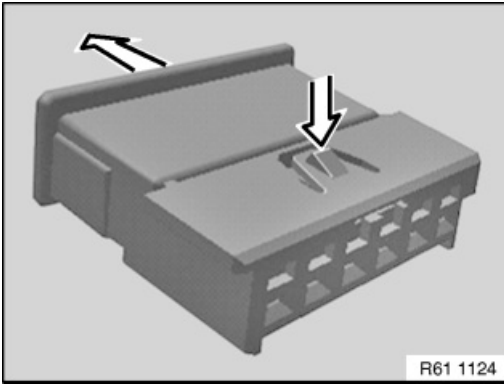
Disconnect plug connection.



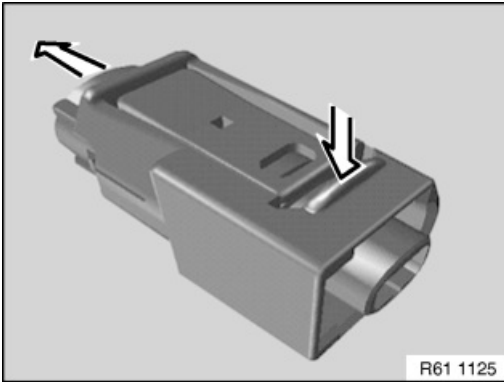
3.

Open release clip in direction of arrow and disconnect plug connection in direction of arrow.

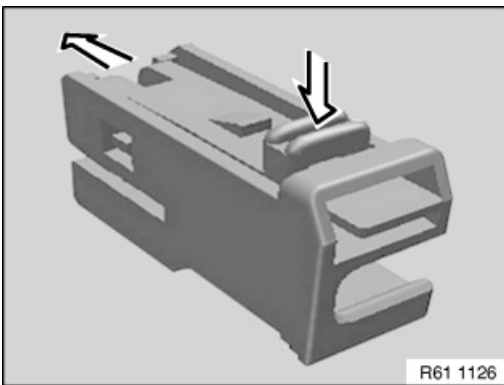




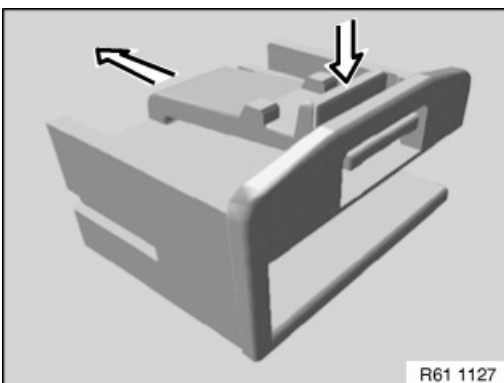
4.
Press lock and disconnect plug connection in direction of arrow.



5.
Press lock and disconnect plug connection in direction of arrow.

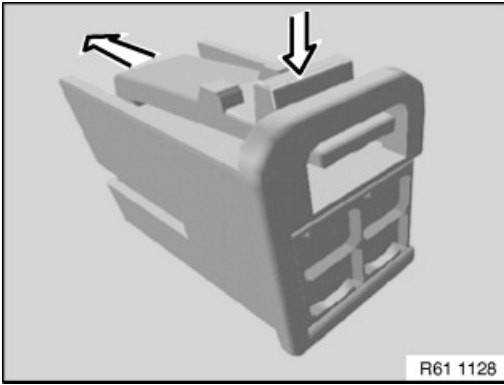


6.
Press lock and disconnect plug connection in direction of arrow.

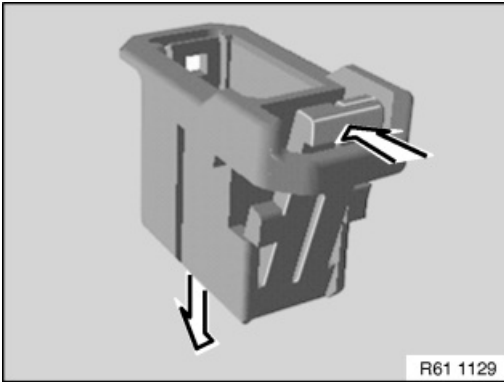


7.
Press lock and disconnect plug connection in direction of arrow.

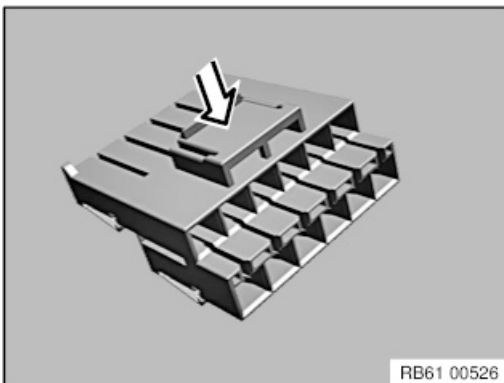




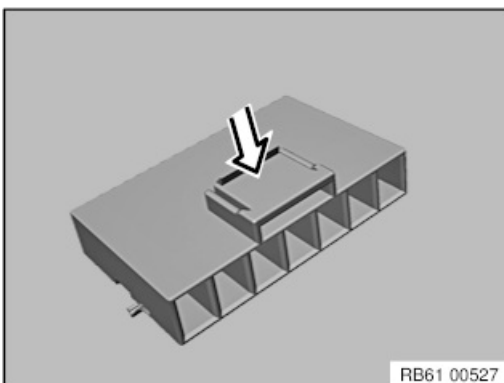
8.
Press lock and disconnect plug connection in direction of arrow.



9.
Press lock and disconnect plug connection in direction of arrow.

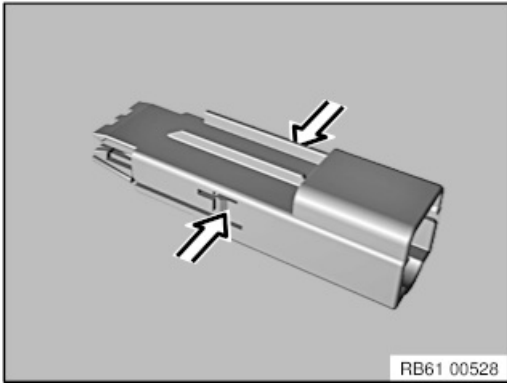


10.
Press the lock and detach plug connection.



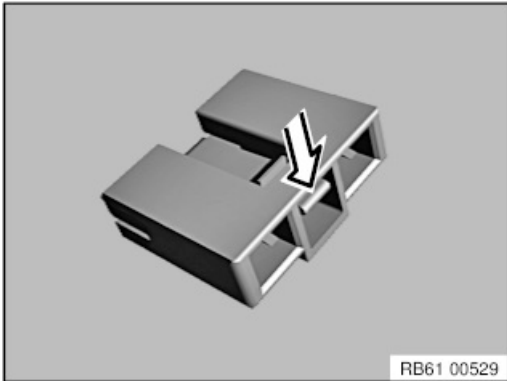
11.
Press the lock and detach plug connection.





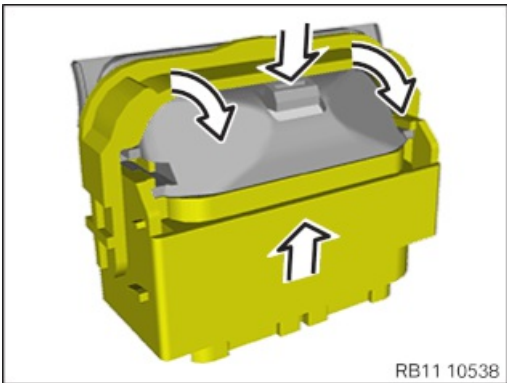
12.

Press the lock on both sides and detach plug connection.



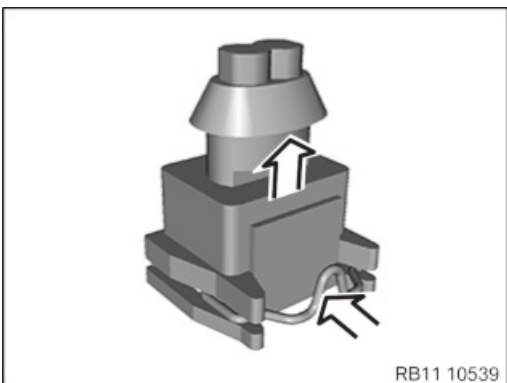
13.

Press the lock and detach plug connection.



14.

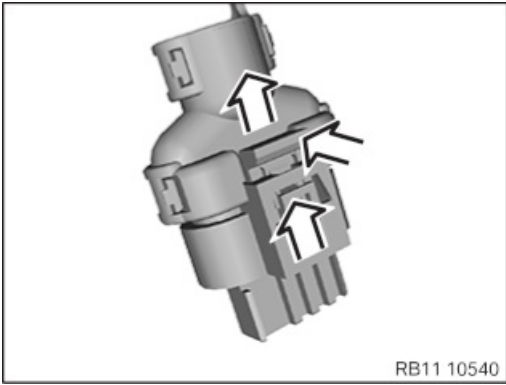
Press lock and open release clip in direction of arrow.
Disconnect plug connection.



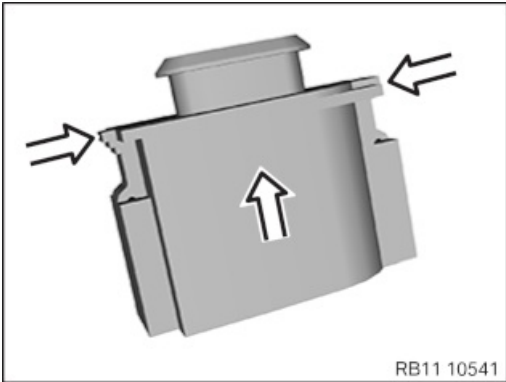
15.

Press the lock and detach plug connection.

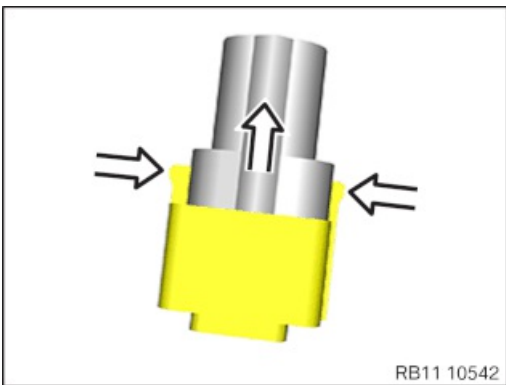




16.
Pull out lock and press.
Disconnect plug connection.



17.
Press the lock and detach plug connection.

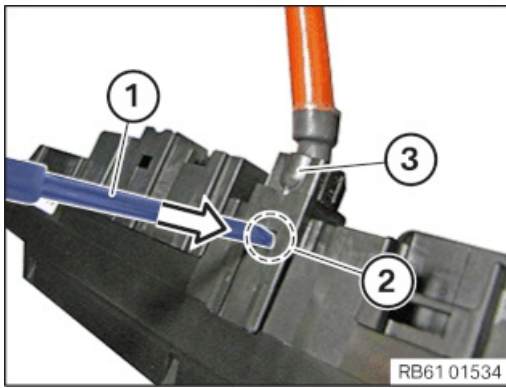


18.
Press the lock and detach plug connection.



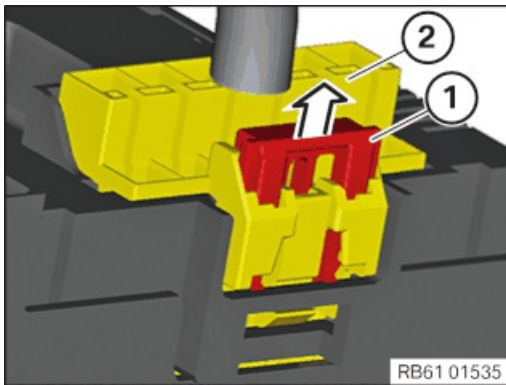
19.
Press the lock and detach plug connection.





20.

Plug connection, e.g. on the power distribution box:
Press into the opening (2) using a suitable tool (1).
Pull off plug connection (3) upwards.



21.

Plug connection, e.g. on the power distribution box:
Lift lock (1) with a suitable tool.
Pull off plug connection (2) upwards.



22.

Vibration resistant high power engine contacts:

Caution!

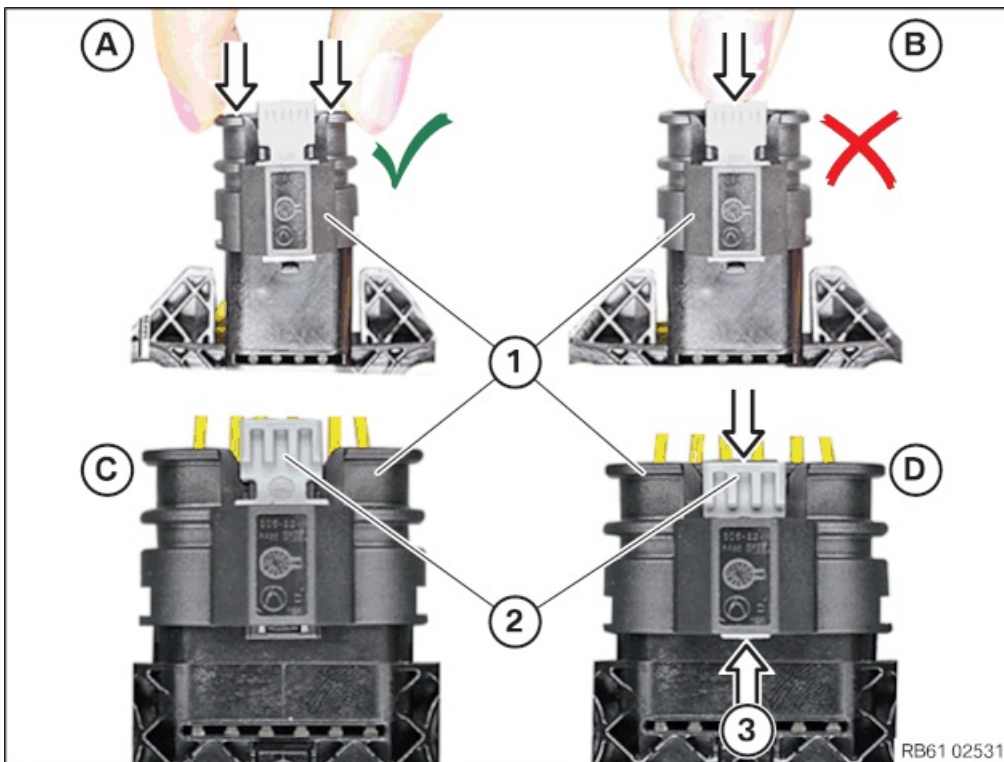
For this connector type, increased forces come into play when disconnecting and closing.

Disconnect:

Pull out lock (1) downward in direction of arrow first.

Then press lock (1) down in direction of arrow and pull off connector.



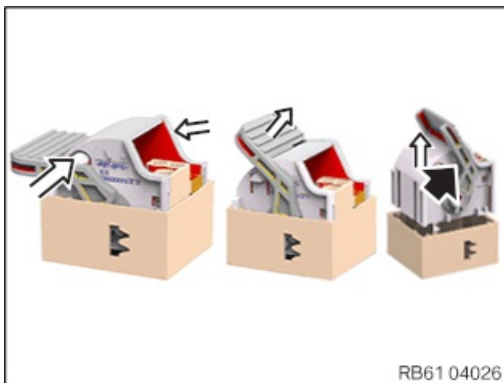


23.

Close:

- A. Press the connector (1) down at the points indicated by the arrow **until it reaches the end position**
- B. **Do not** press the connector (1) further than the lock
- C. Connector (1) is in the end position, but lock (2) is not yet locked
- D. Press lock (2) down in the direction of the arrow until the tip of lock (2) is visible at point (3)

Unlock / lock front light combination plug connection & replace housing after damage:

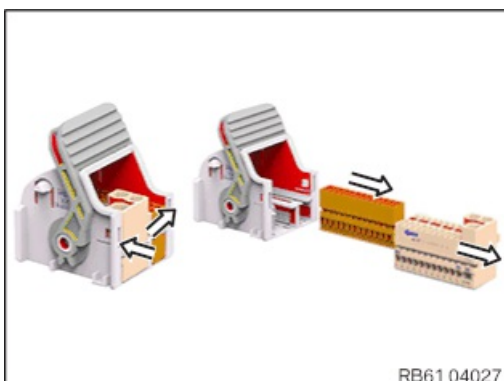


24.

Press in locking lever at both sides until the lever is unlocked and can be moved.

Move lever upwards until it latches into place in the end position.

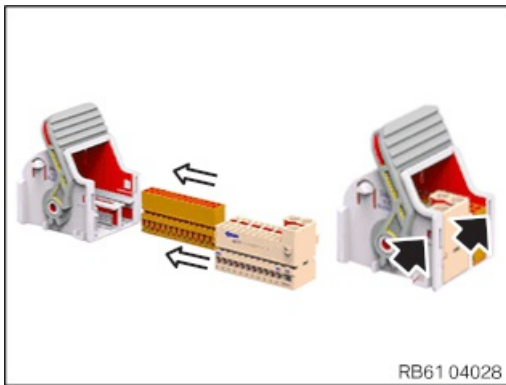
Once the lever is locked in the end position, remove plug connection upwards.



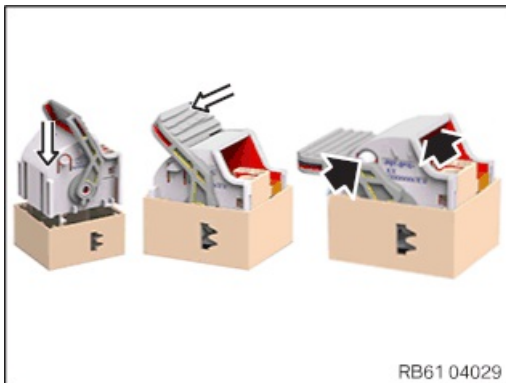
Unlock socket housing by lifting up each of the locking tabs.

Slide out after unlocking the socket housing.

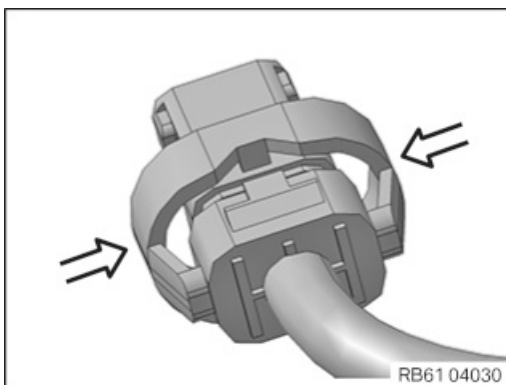




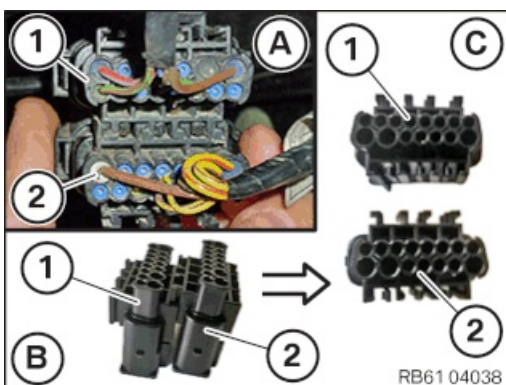
Slide in socket housing up to limit position.
Lock socket housing into place in end position.



Sliding in up to limit position.
Activate plug-in procedure by moving lever downwards.
IMPORTANT: the latch mechanism on both sides only works for a completed plug-in procedure.



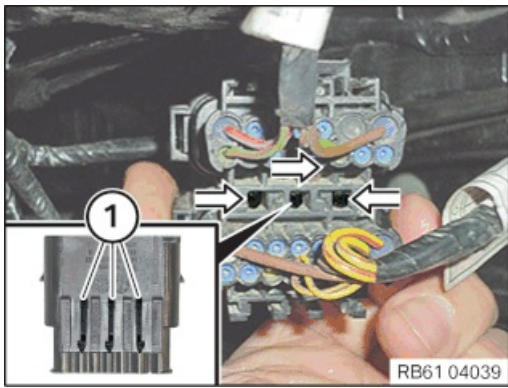
25.
Rosenberger D4S20G-400A5-Y
Press to unlock on both sides.



26.
Pin housing, 15-pinMLK1

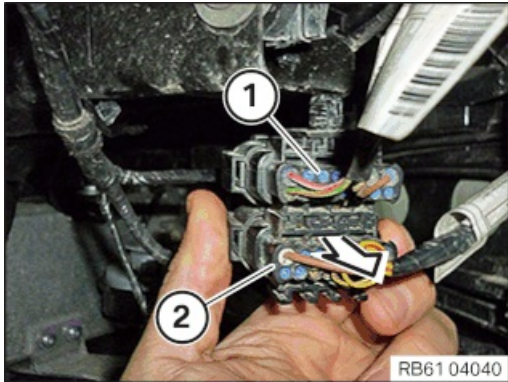
- A & B. To avoid any damage to individual connectors, the given connector assembly consisting of several individual connectors (1) & (2) must be released before disconnecting the plug connection.
- C: released connector assembly





Disconnecting connector assembly:

Release retaining hooks (1) in direction of arrow (detail image shows retaining hooks of individual connector).



Release connector (2) in direction of arrow from connector (1).

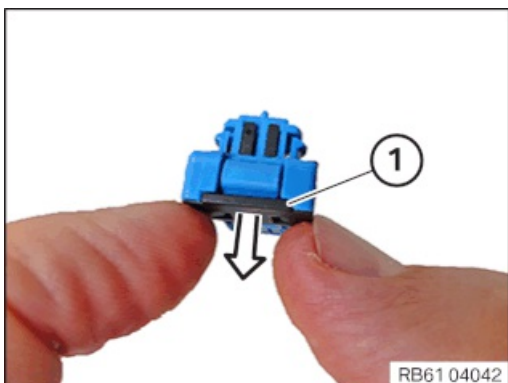


27.

Airbag ignition circuit connector

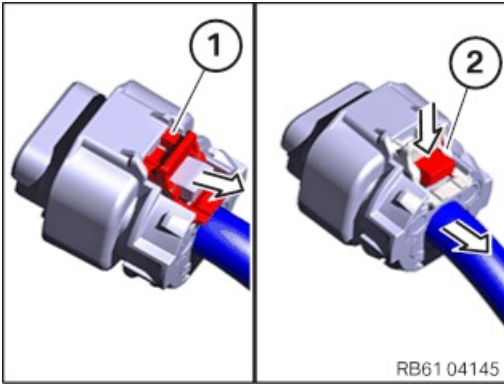
Warning!

Note the safety information for working on vehicles with airbag systems prior to disconnecting the plug connection.



Pull the cap (1) in the direction of the arrow to unlock



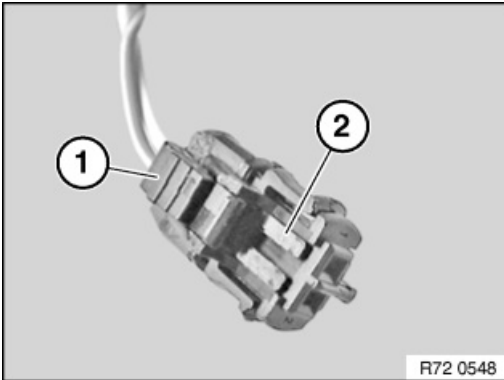


28.

Connector e.g. on front and rear lighting unit

Open safety catch (1) in direction of arrow using appropriate tool.

Push safety catch (2) in direction of arrow and disconnect plug connection.



29.

Plug, e.g. in airbag ignition circuits

Press the lock (1) and pull out the connector (2) up to initial engagement position.

Pull off connector (2).



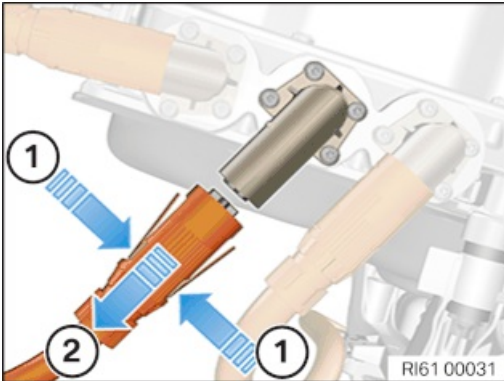
61 13 ... Unlocking and disconnecting various plug connections in electrical and hybrid vehicles



Attention!

Observe the following instructions for handling high-voltage plug connections:

- Damaged high-voltage plug connections must be replaced completely. Repair is not permitted.
- Dirt contamination must be removed before opening the plug connection.



Disconnect the Hirschmann high-voltage connector:

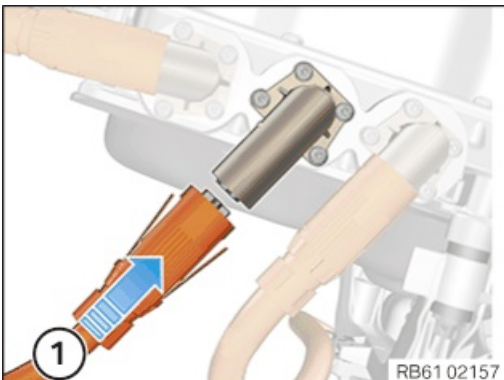
Press the lock (1) on the left and right on the connector in the direction of the arrow.

Pull off connector (2) in direction of arrow.

Attention!

Connector (2) is difficult to pull off.

In the event of damage to high-voltage connector (2), the complete high-voltage cable must be replaced!

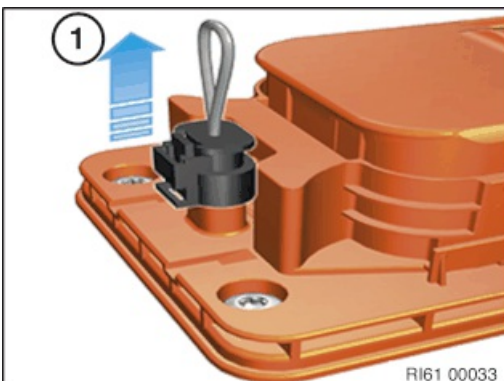


Connect the Hirschmann high-voltage connectors:

Slide the connector (1) on in the direction of the arrow.

Note:

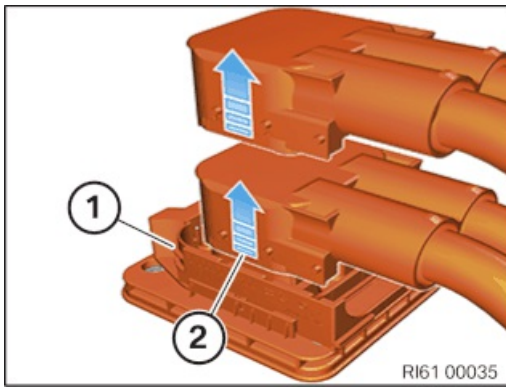
Connector (2) must lock audibly.



Disconnect the Kostal high-voltage connector:

Unlock and disconnect high-voltage interlock loop (1).





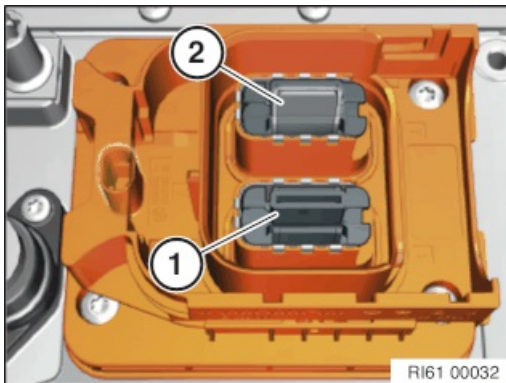
Push the lock (1) fully to the front.

Lift the connector (2) and remove it entirely.

Attention!

Plug connection (3) is difficult to pull off.

The connector (2) must be completely pulled off the opposite housing in one step. Damage may be caused to contact protection if connector is only partly pulled off and then closed again!



Check the Kostal high-voltage connector and connection for damage:

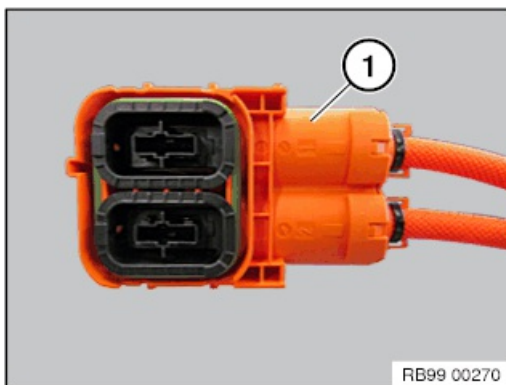
Check the touch protection for damage and correct positioning (1).

Warning!

Do not touch unprotected connector (2)!

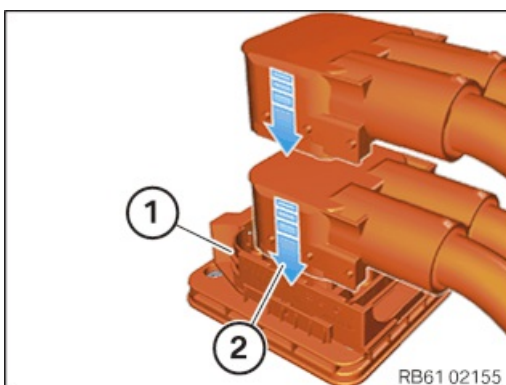
If the contact protection (1) has been pushed to the bottom (2), the high-voltage connector must be refitted.

If contact protection (1) remains in bottom position (2) after reinstallation, the contact protection is faulty and the component must be replaced!



Check the high-voltage connector (1) for damage. **Warning!**

In the event of damage to the high-voltage connector (1), the complete high-voltage cable must be replaced!



Connect the Kostal high-voltage connector:

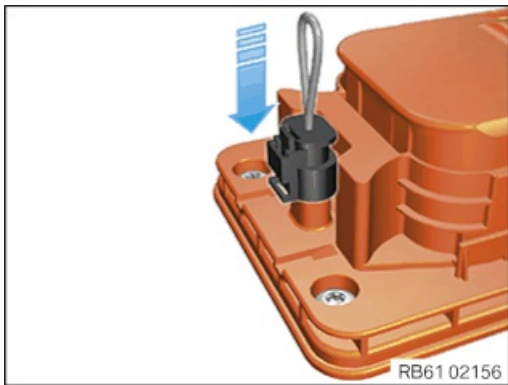
Connect the connector (2) in one single movement to the counter-housing.

Push the lock (1) fully to the rear.

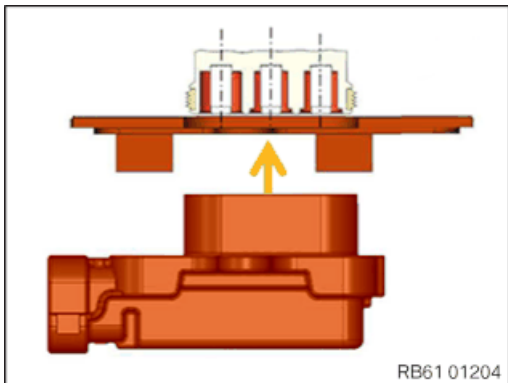
Attention!

Plug connection (3) must be correctly locked by lock (2), otherwise there is a risk of damage.



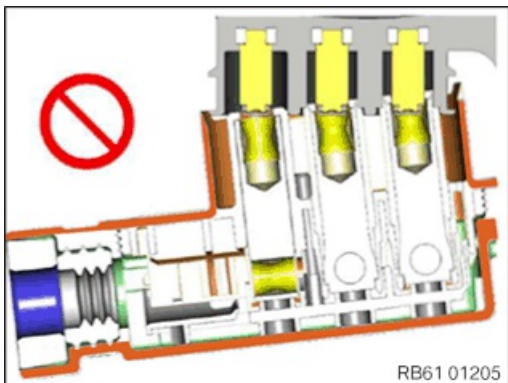


Connect the connector for the high-voltage interlock.



Three-phase high-voltage connector:

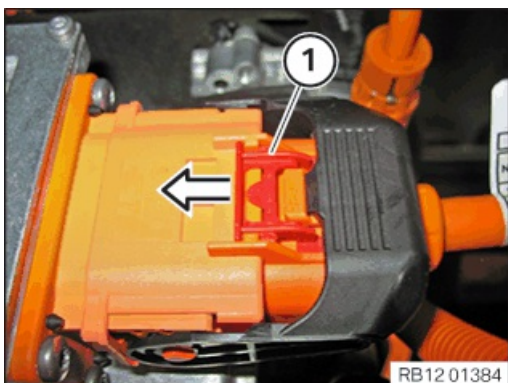
Connect and disconnect the connector straight.



Attention!

The system is designed to only offer limited protection against damage caused by connectors that are inserted at an angle.

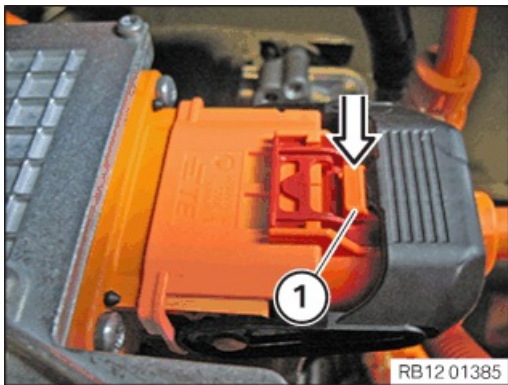
Increased tilted connections will increase the connecting force and the risk of danger.



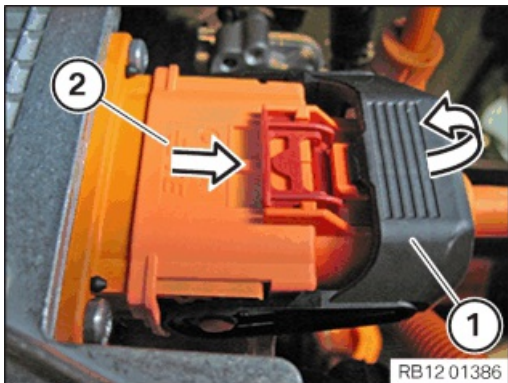
Disconnect the high-voltage connector from the high-voltage connection of the KLE:

Slide lock (1) in direction of arrow up to stop.

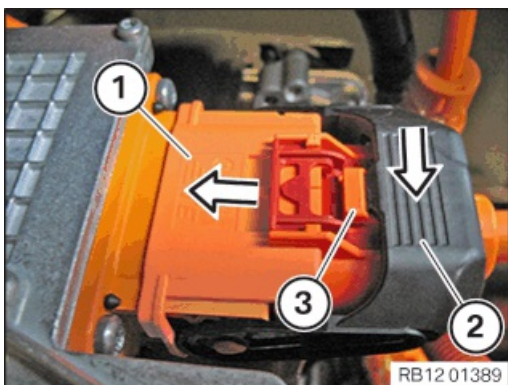




Press lock (1).



Open the lock (1) completely and disconnect the connector (2).



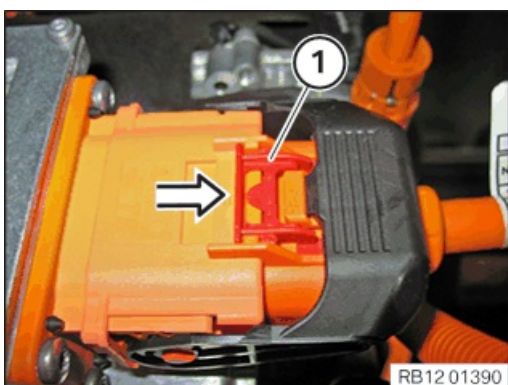
Connect the high-voltage connector to the high-voltage connection of the KLE:

Connect the connector (1) to the limit position and close the lock (2).

Attention!

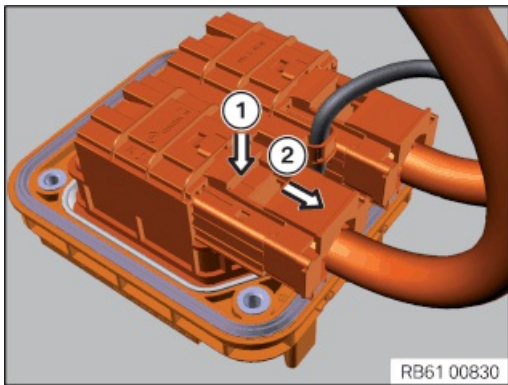
Lock (2) must snap audibly into place.

The retaining lug of the lock (2) must be positioned completely under the lock (2).



Slide the lock (1) on to the stop in the direction of the arrow.





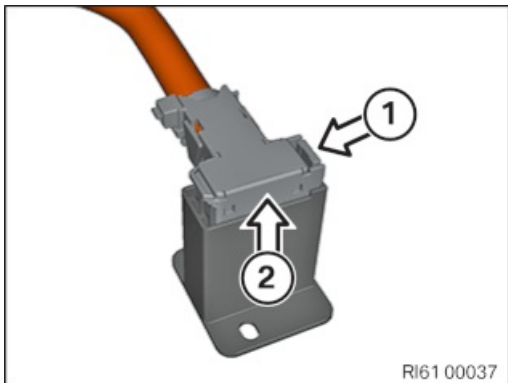
High-voltage connector on the high-voltage connection of the high-voltage battery unit:

Press down unlocking (1) in direction of arrow and pull off connector in direction of arrow (2).

Attention!

Contact protection is no longer provided in the event of a damaged connector housing.

In this case, contact technical support.



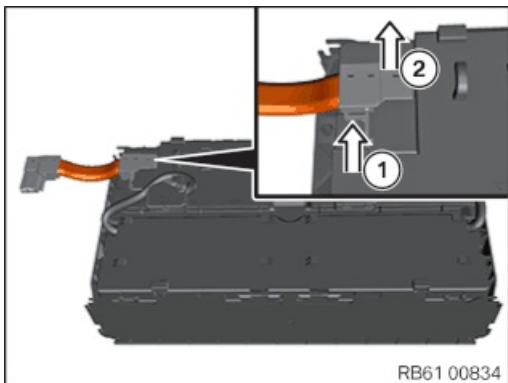
High-voltage connector on the cell module I01:

Press unlocking device (1) together and pull off connector upwards (2).

Attention!

Contact protection is no longer provided in the event of a damaged connector housing.

In this case, contact technical support.



High-voltage connector on the cell module (cell module connecting line):

Press unlocking (1) in direction of arrow and pull off connector in direction of arrow (2).

Attention!

Contact protection is no longer provided in the event of a damaged connector housing.

In this case, contact technical support.





The following applies in general:

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies:

Shielded lines

Interference radiation and interference resistance can lead to neutral zones at contact points in the shielding. Consequently, distinctions have to be drawn between the following types:

Coaxial lines

- Shielded coaxial cables RTK031 may only be repaired with special crimping tool.
- For aerial lines only the bushing contact may be repaired.
- RG174 Lines and the bushing contact may not be repaired.

CVBS lines

- CVBS cables may not be repaired.
- CVBS cables must be replaced in their entirety.

HSD lines

- HSD cables may not be repaired.
- HSD cables must be replaced in their entirety.

Optical fibre cable:

Note:

Fibre-optic cables are coloured differently as follows:

- Green = **MOST** (Media Oriented Systems Transport) optical fibres
- Yellow = **ISIS** (Intelligent Safety and Integration System) optical fibres
- Orange=repair fibre-optic cables

Attention!

- Fibre-optic cables are permitted to show only one junction point (bridge), replace fibre-optic cables if necessary
- Smallest permissible bending radius is 25 mm
- Avoid effects of heat $\geq 85^\circ$

Treating cables and optical fibres

FlexRay (twisted cables)

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

Note:

- FlexRay lines may only reveal one separation point (bridge) per line



- Flexray lines may only reveal one separation point (bridge); renew complete line if necessary.
- If possible, maintain twisted cable after repair.
- After repairs, twist cables as close as possible to the connector/separation point.
- Twisting must be as symmetrical as possible.

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables

Replacing wiring harnesses

Repair wiring harnesses mainly cover the full equipment of the vehicle. If certain optional equipment is not installed in the vehicle, note the following:

- If necessary, secure the remaining connectors.
- If necessary, seal the remaining connectors outside the vehicle interior, for example, with butyl tape in such a way that moisture ingress can be eliminated permanently.

Note:

Repair wiring harnesses can be equipped with an **additional socket housing** (e.g. 30-pin), **which was not provided on the previous vehicle-side wiring harness**. This socket housing also cannot be found in the wiring diagram.

Procedure

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **in the vehicle interior** (in the footwell, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.
- Alternatively, a suitable pin housing can be fitted on the vehicle-side wiring harness and connected to the additional socket housing.

However, this is permitted only if the following conditions are met:

- Carpets must not protrude visibly or become deformed due to the installation of the additional plug connection.
- It must be possible to install the adjacent components (for example, trims, trim panels, etc.) correctly after installing the additional plug connection.
- All the attachment points of the adjacent components (for example, trims, trim panels, etc.) must engage correctly.
- There must be no rattling noise due to the installation of the additional plug connection.
- The additional plug connection must not damage the adjacent components/wiring harnesses, etc..

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **outside the vehicle interior** (in the wheel arch, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.



- **Using the additional socket housing is not permitted with a separation point outside the vehicle interior.**

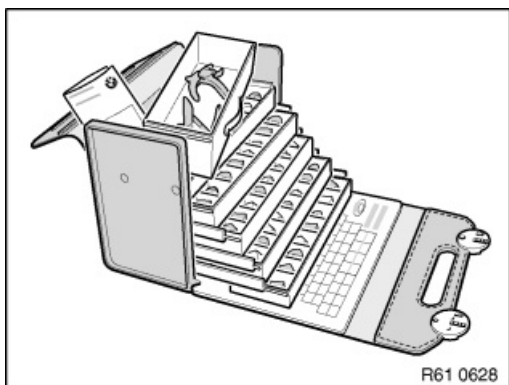


61 13 ... Special tools for wiring harness repairs



Special tools required:

- 61 0 300
- 61 0 400
- 61 1 100
- 61 4 320
- 61 0 200
- 61 0 210
- 61 0 220
- 61 0 230
- 61 0 240



Repair range, vehicle electrical system:

Single parts for wiring harness repairs*

* Sourcing reference: BMW Parts Department

Note:

- Refer to Service Information:
SI 2 04 07 341



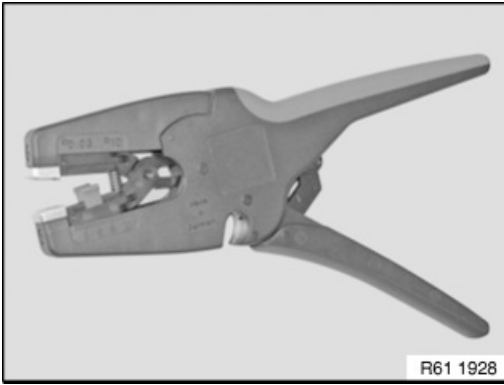
Release and press-out tool:

- Special tool 61 0 300
- Special tool 61 0 400 (MINI N12/N14)
- Special tool 61 1 100 (engine)

Handling:

- Notes for opening contacts and locks of different connector contact systems





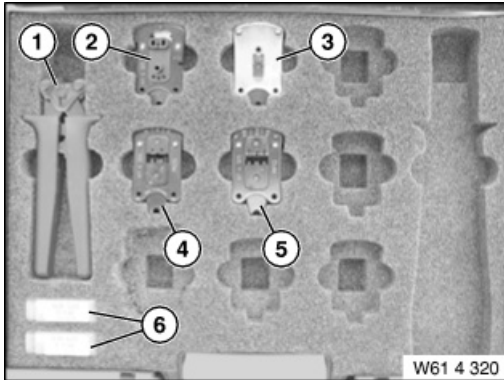
Cutting to length and stripping insulation from cables:

Wire stripper MultiStrip10*

*Sourcing reference BMW Workshop Equipment Catalogue

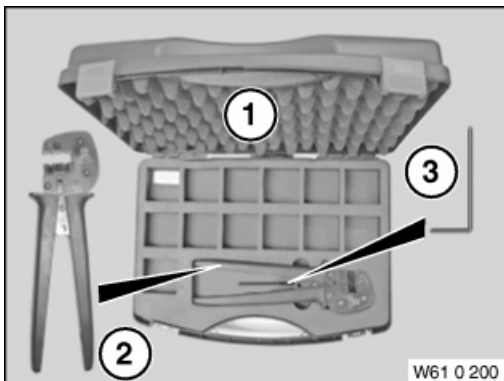
Handling:

- Cutting cables to length and strip insulation



Crimping stop parts (small contacts) and butt connectors:

- Special tool 61 4 320
 1. Tool without crimping head
 2. Crimping head (stripping insulation and cutting fibre-optic cables to length)
 3. Crimping head (crimping fibre-optic cable contacts)
 4. Crimping head (crimping MQS contacts)
 5. Crimping head (crimping MPQ contacts)
 6. Replacement blade (face-cutting fibre-optic cables)
 7. Replacement blade with tool (insulation stripping unit)
 8. Universal crimping head (SI 2 04 06 293)



Crimping stop parts (large contacts) and butt connectors:

- Special tool 61 0 200 (crimping set)
- Special tool 61 0 210 (matrix set SLK 8)
- Special tool 61 0 220 (matrix set SLK 2.8)
- Special tool 61 0 230 (matrix set MAK 8 / DFK4)
- Special tool 61 0 240 (butt connector 4.0 - 6.0 mm²)

Handling:

- Refer to Service Information:
SI 2 02 05 194
SI 2 07 05 233



61 12 ... Information on intelligent battery sensor (IBS)

Notice! Do not connect the charger to the 12 V charging socket

The 12 V charging socket is supplied with voltage by the rear power distribution box via relay. This relay drops out after terminal 15 OFF. This means that a trickle charger connected at the 12 V charging socket will be disconnected from the battery. Only charge the battery via the jump start terminal point. Only then can the voltage supply be registered by the vehicle.

Warning! Danger of destruction in event of mechanical strain

- Do not introduce any additional connections at the battery negative terminal.
- Do not modify the grounding cable. The ground cable also serves heat dissipation.
- Do not establish any connection between the IBS and the sensor screw.
- Do not use force when disconnecting the pole shoe from the battery terminal:
 - Do not pull on the ground cable.
 - Do not place any tools under the IBS to lever off the pole shoe.
- Do not use IBS connections as levers.
- Use a torque wrench and set tightening torque in accordance with repair instructions.
- Do not release or tighten down sensor screw (Torx screw).
- Avoid contact between IBS and ground.

Warning! Danger of destruction to IBS and wiring upon battery replacement

- The IBS and wiring can be destroyed by mechanical strain upon battery replacement. Therefore avoid mechanical strain.
- The size (capacity) of the battery required for the car is coded in the Car Access System (CAS).
- Use the battery size (capacity) installed as standard upon battery replacement.
- Recode the Car Access System (CAS) when installing a battery with a different capacity.
- Register battery replacement via Service functions in diagnosis system.
- Delete fault code entries in the Digital Engine Electronics (DME) associated with battery replacement.
- Always proceed in accordance with the repair instructions.

Note: Battery draining possible in spite of the intelligent battery sensor IBS being fault-free.

- A battery can be drained (e.g. with lights or radio switched on) even when the IBS functions perfectly in conjunction with power management.
- **For this reason, only exchange the IBS when there is a corresponding fault code entry!**



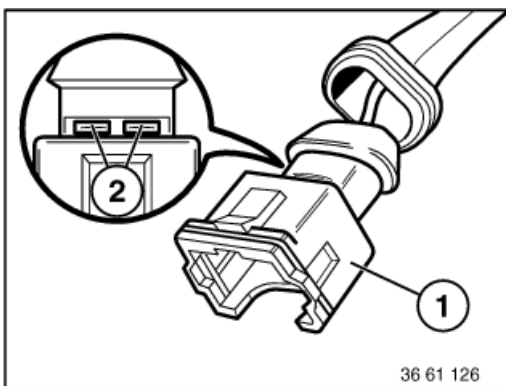


Special tools required:

- 61 0 300
- 61 0 400
- 61 1 100

Abbreviations of contacts and what they mean:

ELA	Strand seal
D 1.5 / 2.5 / 3.5	Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter
MDK	Miniature double flat spring contact
JPT	Junior Power timer
DFK	Double flat spring contacts
Elo	Electronic contacts
Elo Power	Electronic contacts for heavy load
MQS	Micro Quadlock system
MPQ	Micro Power Quadlock
MLK	Mini laminated contact
SLK	Sensor laminated contact
LSK	Load current contact
MLK	Mini laminated contact
Mcon	Multi contact



Important!

The contacts can be changed on ultrasonically welded connectors (1).

Ultrasonically welded connectors (1) must be replaced completely.

Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.



Note:

Special tools referred to in the repair instructions below are contained in the following special tool sets:

- Unlocking and pressing-off tool 61 1 150
is replaced as of 09/2005 by 61 0 300 (BMW) and 61 0 400 (MINI)
- Release and pressing-off tool 61 1 100 (engine)



Repair instructions for opening connector housings and removing contacts of different connector systems:

Connector system D 1.5/D 2.5:

- Circular connectors, 7- or 8-pin, system D 2.5
- Circular connectors, 13-pin, system D 2.5
- Circular connectors, 20-pin, system D 2.5
- Circular connectors, 4-, 7-, 10-, 12- or 25-pin, system D 1.5/D 2.5
- In-line connectors, 15-pin, system D 2.5
- In-line connectors, 8-, 12-pin, system D 2.5
- In-line connectors, 30-pin, system D 2.5
- In-line connectors, 20-pin, system D 2.5

Connector system JPT/MDK/DFK:

- In-line connectors, 2-pin, System JPT ELA
- In-line plugs, 2-pin, System MDK 3 plus 2.8
- In-line plugs, 4-pin, System DFK ELA

Connector system Elo/Elo Power:

- Inline plugs, 4-, 10-pin, System Elo
- In-line connectors, 6- to 50-pin, System Elo
- Inline plugs, 3-, 6-pin, System Elo-Power 2.8

Connector system LSK:

- Connector housing LSK contact

Connector system MQS/MPQ:

- Inline connectors, 6-, 8-pin, System MQS
- Inline plugs, 2-pin, System MPQ 2.8
- Control unit connectors, 25-, 35-, 55-, 83-, 88-pin
- In-line plugs, 24-pin, Hybrid System MQS/MPQ
- Socket housing 42-, 43-pin, Hybrid System MQS / MPQ
- Socket housings 2x21-, 2x27-pin, Hybrid System MQS/MPQ, Elo/Elo Power
- In-line connectors, 30-pin, Hybrid System MQS/MPQ
- Socket housings, 5-, 8-pin, System MQS/MPQ
- Socket housing (radio connector), Hybrid System MQS/MPQ

For connector contact systems not listed, refer to Service Information:

SI 2 05 05 217

SI 2 05 06 294

SI 2 03 08 440

SI 2 08 06 312

SI 2 02 08 439

SI 2 01 08 438





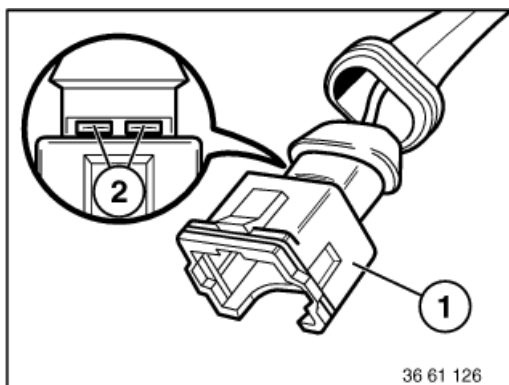


Special tools required:

- 61 0 300
- 61 0 400
- 61 1 100
- 61 1 150

Abbreviations of contacts and what they mean:

ELA	Strand seal
D 1.5 / 2.5 / 3.5	Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter
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The contacts can be changed on ultrasonically welded plugs (1).
Ultrasonically welded plugs (1) must be replaced completely.
Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.



Note:

Special tools referred to in the repair instructions below are contained in the following special tool kits:

- Release and press-out tool 61 1 150
is replaced from 09/2005 by 61 0 300 (BMW) and 61 0 400 (MINI)
- Release and press-out tool 61 1 100 (engine)



Repair instructions for opening plug housings and removing contacts of different plug systems:

Plug system D 1.5/D 2.5:

- Circular plugs, 7-, 8-pin, System D 2.5
- Circular plugs, 13-pin, System D 2.5
- Circular plugs, 20-pin, System D 2.5
- Circular plugs, 4-, 7-, 10-, 12-, 25-pin, System D 1.5/D 2.5
- In-line plugs, 15-pin, System D 2.5
- In-line plugs, 8-, 12-pin, System D 2.5
- In-line plugs, 30-pin, System D 2.5
- In-line plugs, 20-pin, System D 2.5

Plug system JPT/MDK/DFK:

- In-line plugs, 2-pin, System JPT ELA
- In-line plugs, 2-pin, System MDK 3plus 2.8
- In-line plugs, 4-pin, System DFK ELA

Plug system Elo/Elo-Power:

- In-line plugs, 4-, 10-pin, System Elo
- In-line plugs, 6- to 50-pin, System Elo
- In-line plugs, 3-, 6-pin, System Elo-Power 2.8

Plug system MQS/MPQ:

- In-line plugs, 6-, 8-pin, System MQS
- In-line plugs, 2-pin, System MPQ 2.8
- Control unit plugs, 25-, 35-, 55-, 83-, 88-pin
- In-line plugs, 24-pin, Hybrid System MQS/MPQ
- Socket housing 42-, 43-pin, Hybrid System MQS / MPQ
- Socket housings 2x21-, 2x27-pin, Hybrid System MQS/MPQ, Elo/Elo-Power
- In-line plugs, 30-pin, Hybrid System MQS/MPQ
- Socket housings, 5-, 8-pin, System MQS/MPQ
- Socket housing (radio plug), Hybrid System MQS/MPQ

For plug contact systems not listed, refer to Service Information:

SI 2 05 05 217

SI 2 05 06 294

SI 2 03 08 440

SI 2 08 06 312

SI 2 02 08 439

SI 2 01 08 438



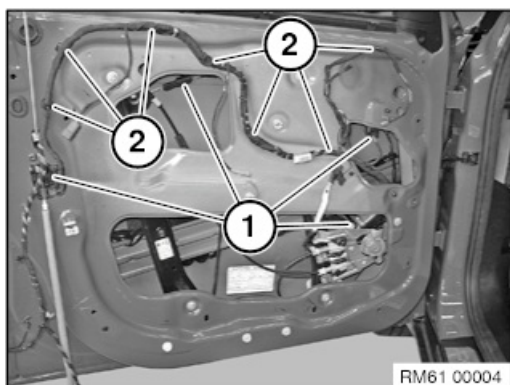


Read and comply with notes on handling wiring harnesses and cables.



Necessary preliminary work:

- Remove sound insulation at left front door

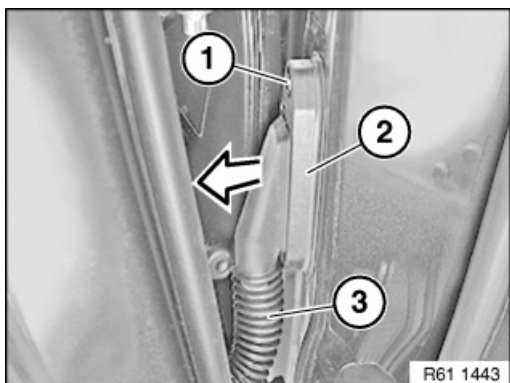


Unlock plug connections (1) and disconnect.

Unclip door wiring harness at points (2).

Installation note:

Make sure door wiring harness is correctly laid.



Release screw (1).

Fold door wiring harness plug on A-pillar (2) downwards slightly and remove.

Unlock plug connection behind and disconnect.

Pull rubber grommet (3) out of front door.

Feed out door wiring harness towards front to A-pillar.



**Important!**

Read and comply with notes on handling wiring harnesses and cables.

**Necessary preliminary work:**

- Remove sound insulation on left-hand rear door

Operation is described in:

Replacing wiring harness of left front door.



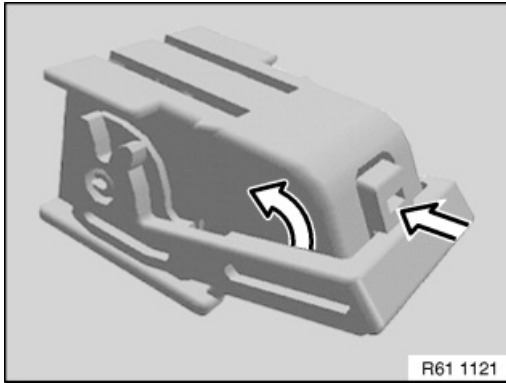
61 13 ... Unlocking and disconnecting different plug connections



Note:

The document describes unlocking and disconnecting different types of plug connections.

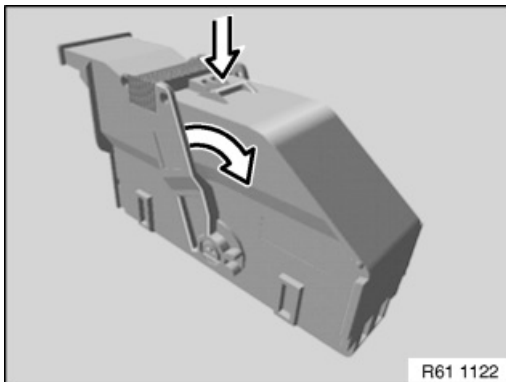
Differences in the details of the size and shape of the plug connections are possible.



1.

Press lock and open release clip in direction of arrow.

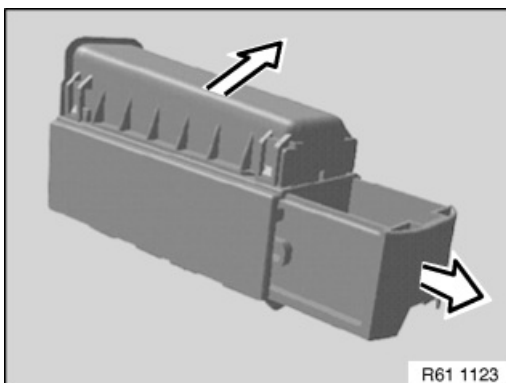
Disconnect plug connection.



2.

Press lock and open release clip in direction of arrow.

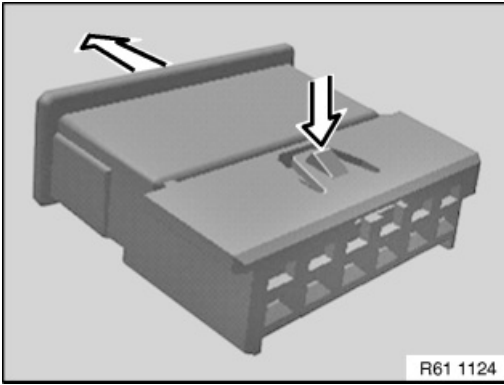
Disconnect plug connection.



3.

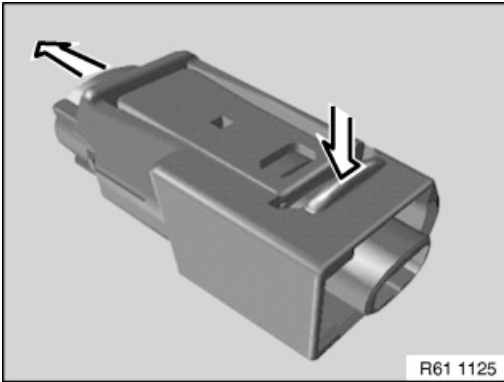
Open release clip in direction of arrow and disconnect plug connection in direction of arrow.





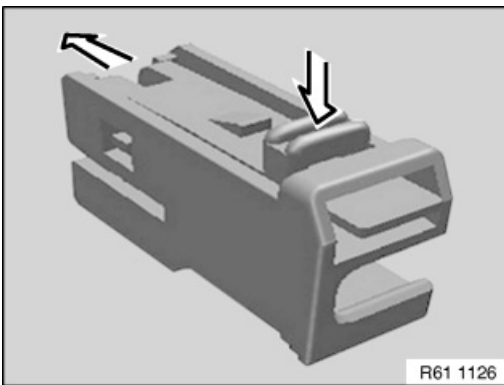
4.

Press lock and disconnect plug connection in direction of arrow.



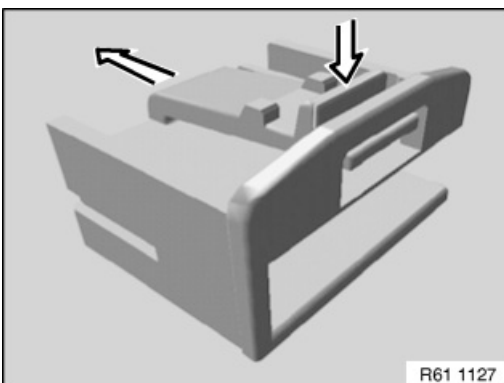
5.

Press lock and disconnect plug connection in direction of arrow.



6.

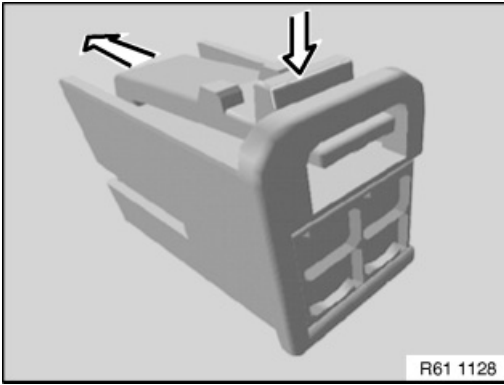
Press lock and disconnect plug connection in direction of arrow.



7.

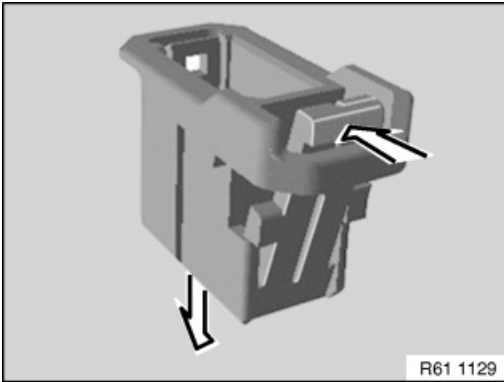
Press lock and disconnect plug connection in direction of arrow.





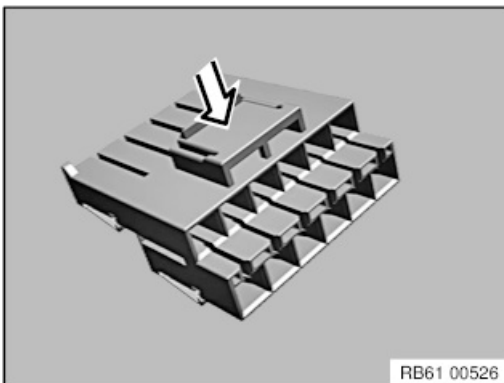
8.

Press lock and disconnect plug connection in direction of arrow.



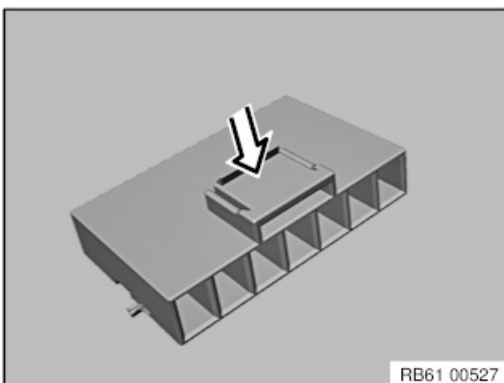
9.

Press lock and disconnect plug connection in direction of arrow.



10.

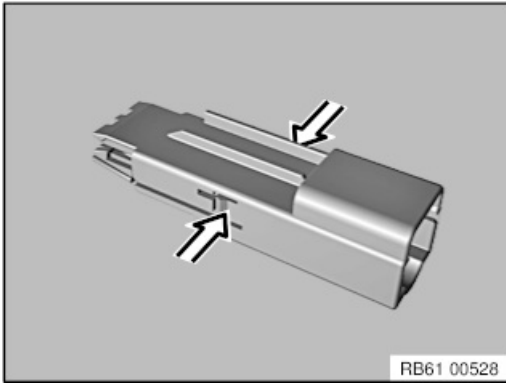
Press the lock and detach plug connection.



11.

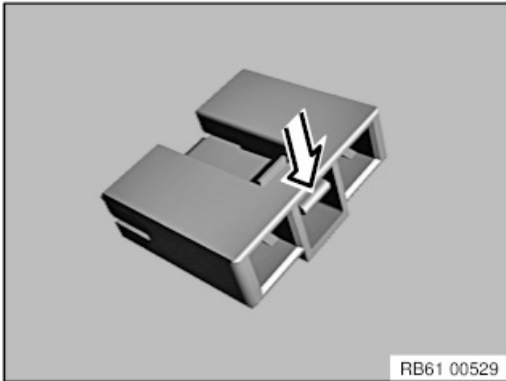
Press the lock and detach plug connection.





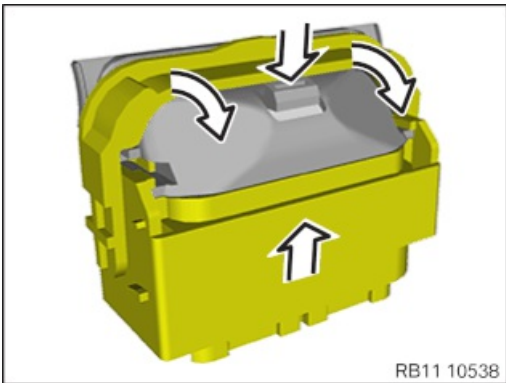
12.

Press the lock on both sides and detach plug connection.



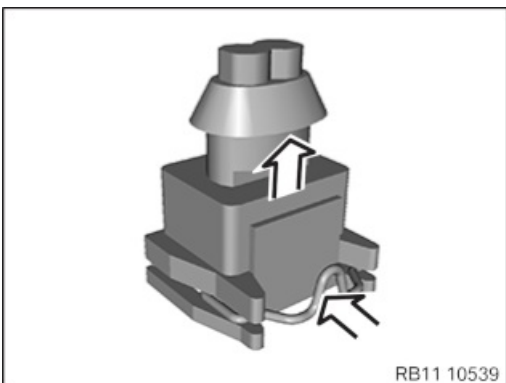
13.

Press the lock and detach plug connection.



14.

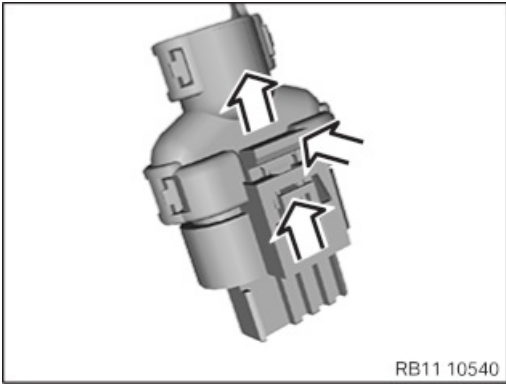
Press lock and open release clip in direction of arrow.
Disconnect plug connection.



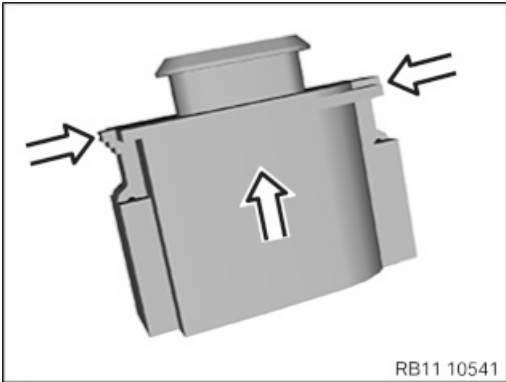
15.

Press the lock and detach plug connection.

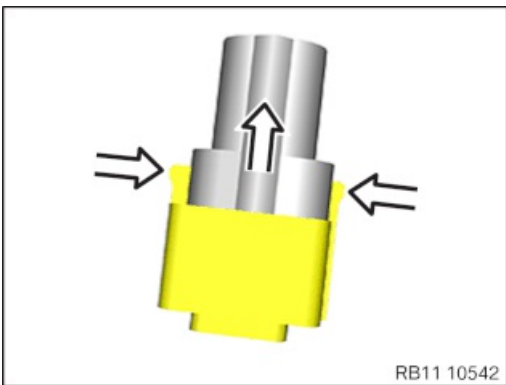




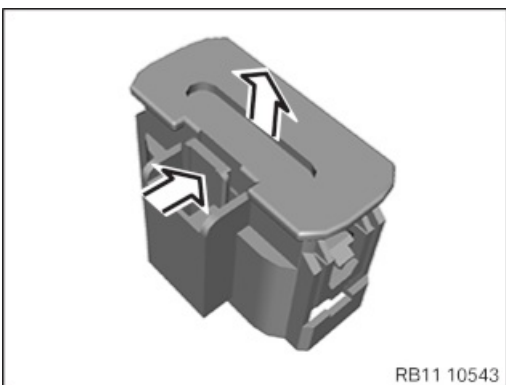
16.
Pull out lock and press.
Disconnect plug connection.



17.
Press the lock and detach plug connection.

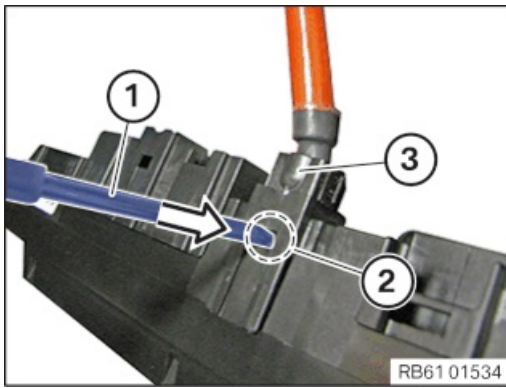


18.
Press the lock and detach plug connection.



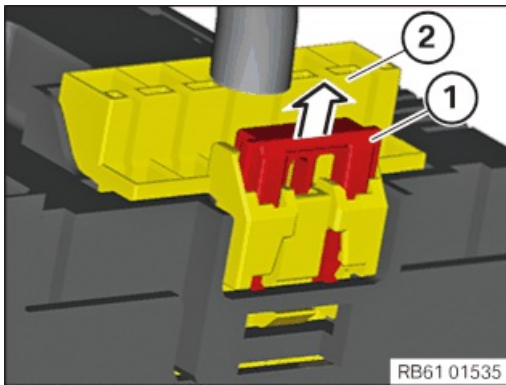
19.
Press the lock and detach plug connection.





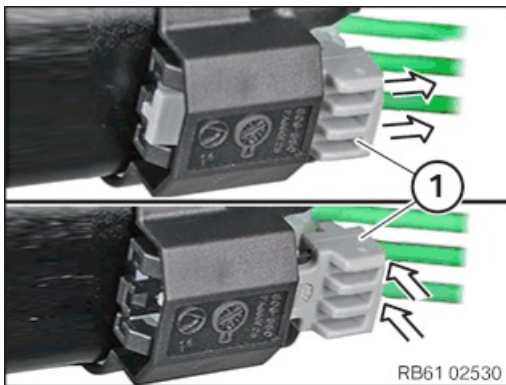
20.

Plug connection, e.g. on the power distribution box:
Press into the opening (2) using a suitable tool (1).
Pull off plug connection (3) upwards.



21.

Plug connection, e.g. on the power distribution box:
Lift lock (1) with a suitable tool.
Pull off plug connection (2) upwards.



22.

Vibration resistant high power engine contacts:

Caution!

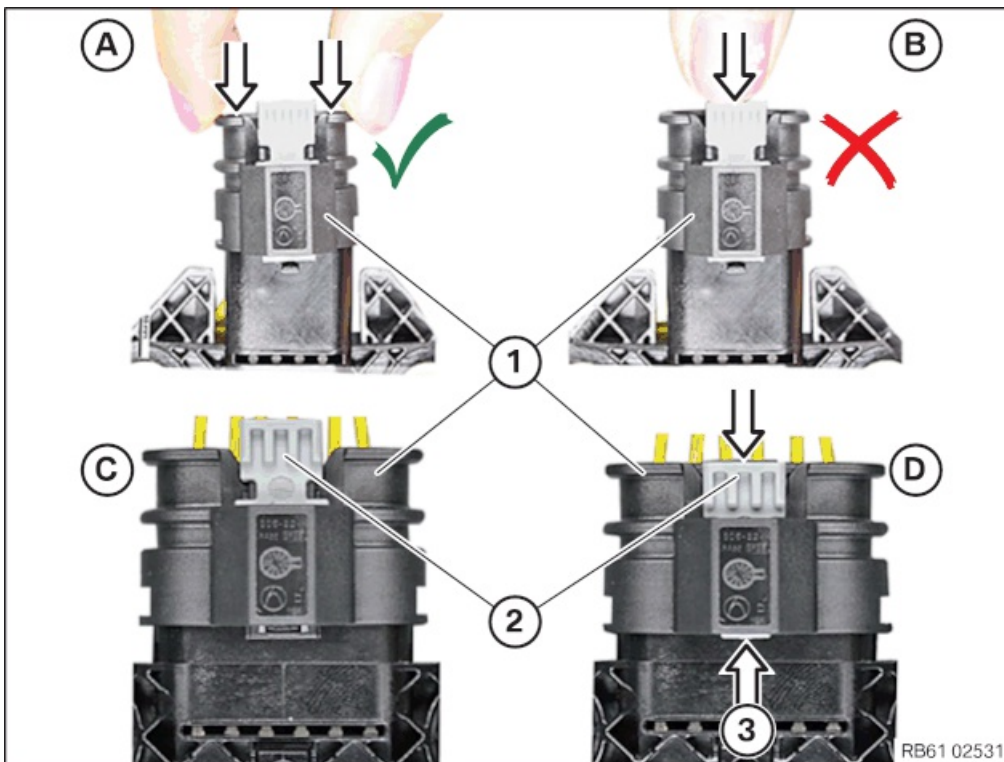
For this connector type, increased forces come into play when disconnecting and closing.

Disconnect:

Pull out lock (1) downward in direction of arrow first.

Then press lock (1) down in direction of arrow and pull off connector.



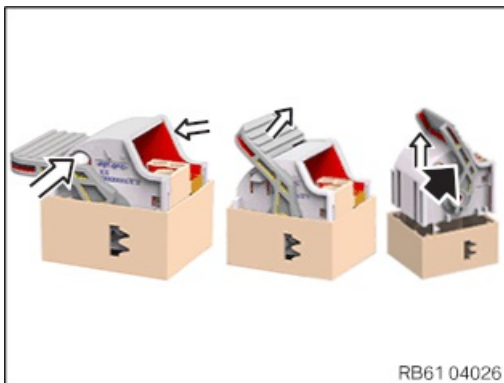


23.

Close:

- A. Press the connector (1) down at the points indicated by the arrow **until it reaches the end position**
- B. **Do not** press the connector (1) further than the lock
- C. Connector (1) is in the end position, but lock (2) is not yet locked
- D. Press lock (2) down in the direction of the arrow until the tip of lock (2) is visible at point (3)

Unlock / lock front light combination plug connection & replace housing after damage:

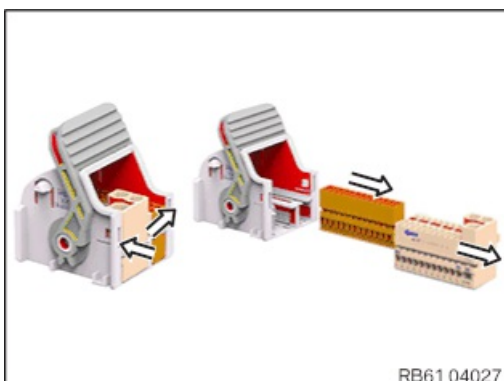


24.

Press in locking lever at both sides until the lever is unlocked and can be moved.

Move lever upwards until it latches into place in the end position.

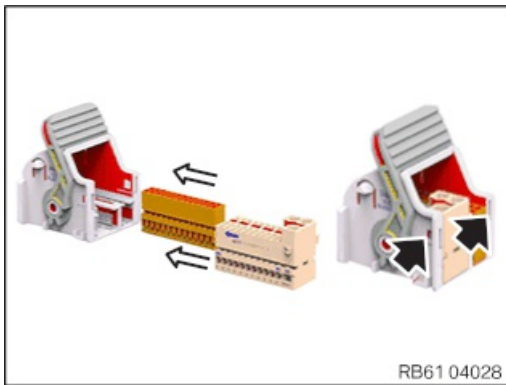
Once the lever is locked in the end position, remove plug connection upwards.



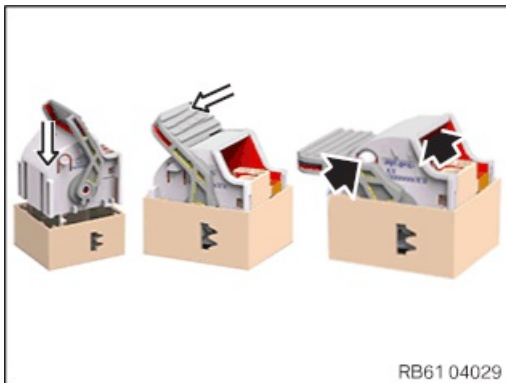
Unlock socket housing by lifting up each of the locking tabs.

Slide out after unlocking the socket housing.

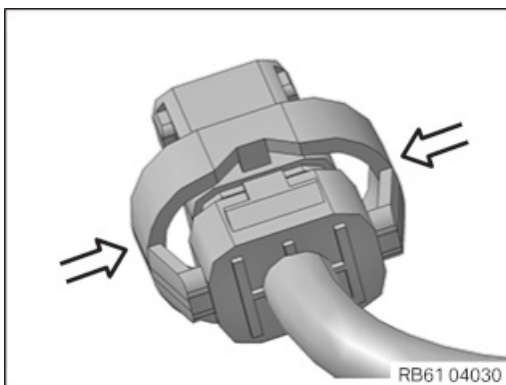




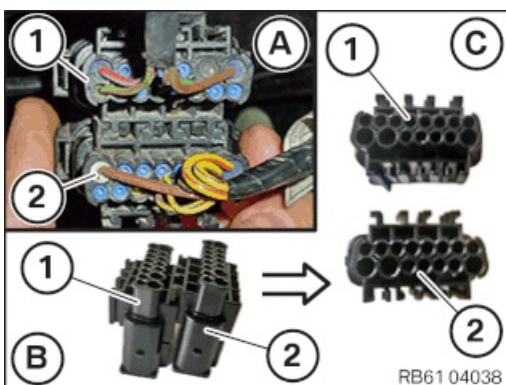
Slide in socket housing up to limit position.
Lock socket housing into place in end position.



Sliding in up to limit position.
Activate plug-in procedure by moving lever downwards.
IMPORTANT: the latch mechanism on both sides only works for a completed plug-in procedure.



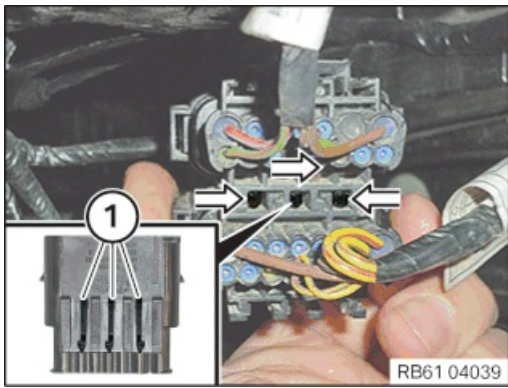
25.
Rosenberger D4S20G-400A5-Y
Press to unlock on both sides.



26.
Pin housing, 15-pinMLK1

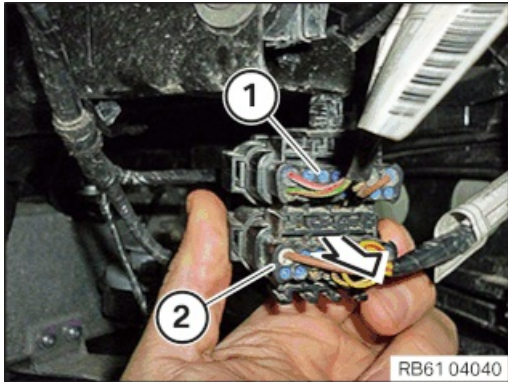
- A & B. To avoid any damage to individual connectors, the given connector assembly consisting of several individual connectors (1) & (2) must be released before disconnecting the plug connection.
- C: released connector assembly





Disconnecting connector assembly:

Release retaining hooks (1) in direction of arrow (detail image shows retaining hooks of individual connector).



Release connector (2) in direction of arrow from connector (1).

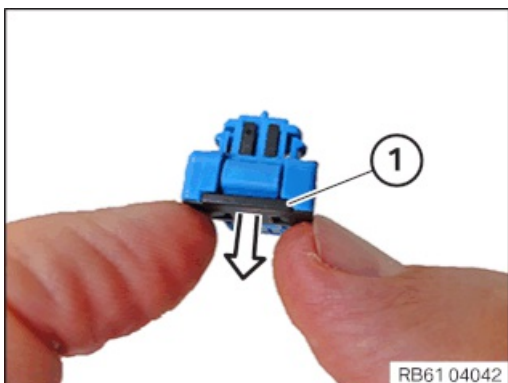


27.

Airbag ignition circuit connector

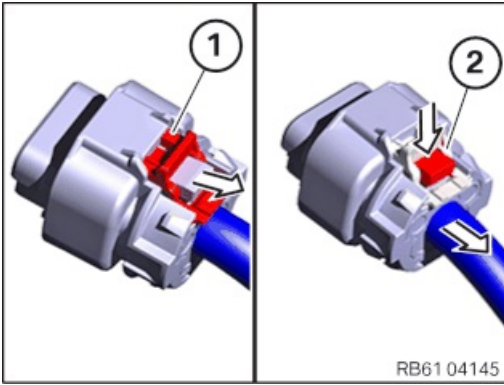
Warning!

Note the safety information for working on vehicles with airbag systems prior to disconnecting the plug connection.



Pull the cap (1) in the direction of the arrow to unlock



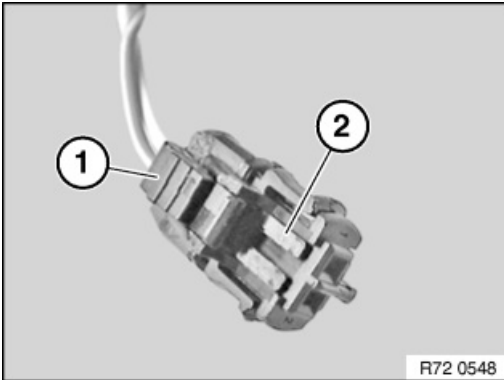


28.

Connector e.g. on front and rear lighting unit

Open safety catch (1) in direction of arrow using appropriate tool.

Push safety catch (2) in direction of arrow and disconnect plug connection.



29.

Plug, e.g. in airbag ignition circuits

Press the lock (1) and pull out the connector (2) up to initial engagement position.

Pull off connector (2).



61 13 ... Butt connector for repairing a plug connection



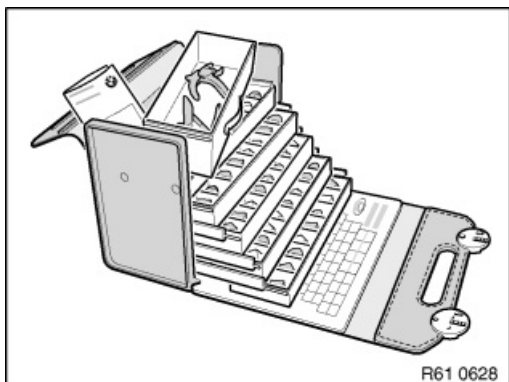
Special tools required:

- 61 0 300
- 61 9 040



Important!

1. Identify cause of damage (e.g. sharp-edged body components, faulty electrical loads, jammed mechanisms, corrosion caused by ingress of water, etc.).
2. Read out fault memory
3. Eliminate cause of damage.
4. Disconnect battery negative terminal
5. Make sure that no safety-related system according to circuit diagram (e.g. antilock braking system, active rear-axle kinematics, airbags, etc.) are influenced. Otherwise replace faulty wiring harness or use repair cable (sourcing reference: BMW Parts Department)
6. Carry out function test and read out fault memories again
7. Eliminate new faults if applicable and clear fault memories



Note:

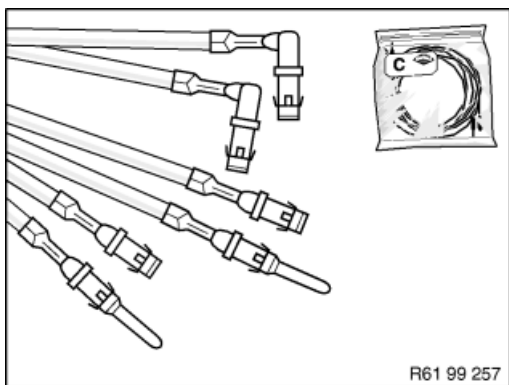
The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.

The case can no longer be ordered. Order individual parts for wiring harness repair through BMW Parts Department.

- Refer to Service Information:
SI 02 04 07 341

Special tools:

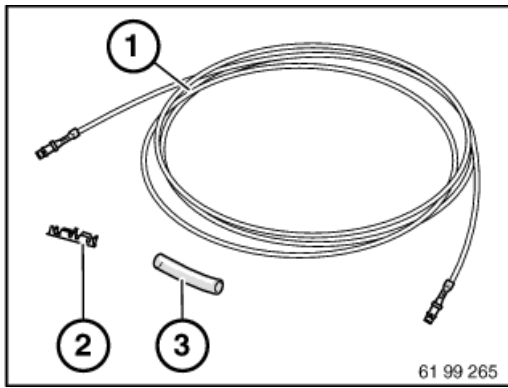
- Special tool 61 9 040



Choose repair kit.

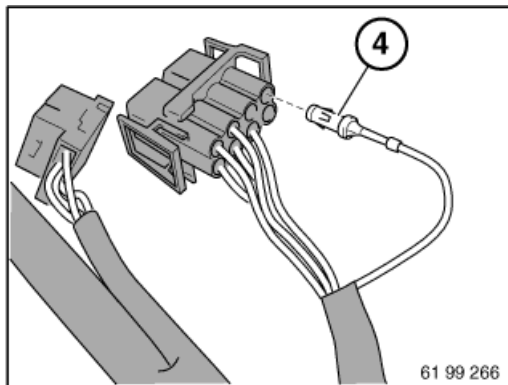
Example: Repair kit, circular connector system D 2.5.





Remove following parts:

- (1) Pre-packaged end of cable with requisite wire cross-section
- (2) Crimp connector for selected wire cross-section
- (3) Shrink-fit hose

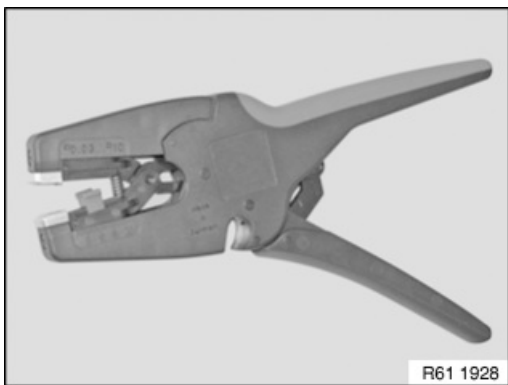


Open secondary lock on housing.

Mark damaged contact (4) with socket number of housing and press it out of housing using appropriate special tool contained in special tool set 61 0 300).

See repair instructions

Opening plug housings and removing contacts of different plug systems



Important!

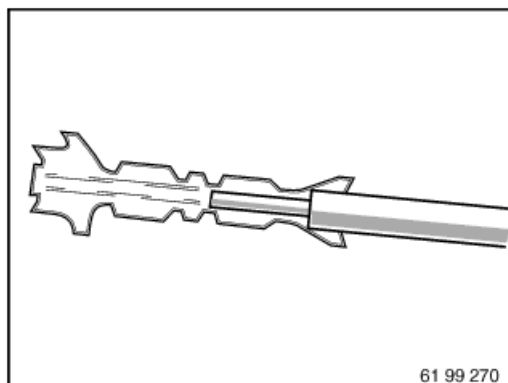
- Check maximum length of repair cable
- If more than one wire is to be repaired, the individual interfaces must be offset so that the wiring harness is not too thick at the repaired point.

Adhere to following procedure:

- Cut off wire with faulty contact at point which is easily accessible
- Strip insulation from end of wire at wiring harness end
- Cut preassembled wire end to length and strip insulation

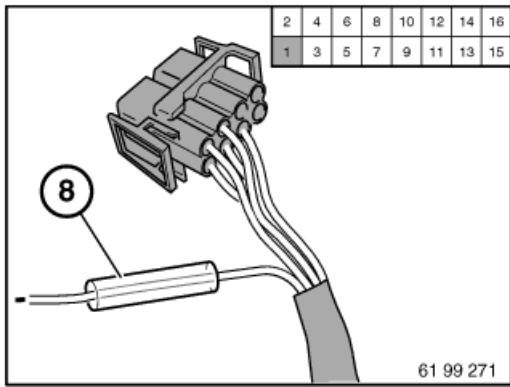
Refer also to repair instruction:

Cutting to length and stripping insulation from cables

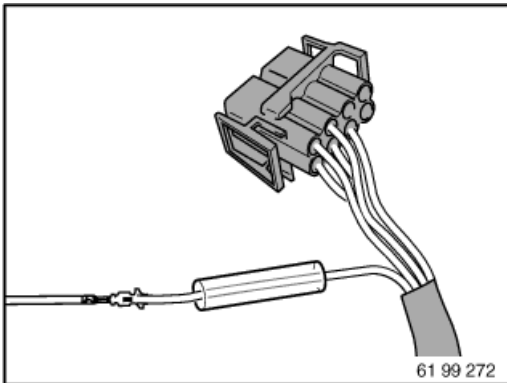


Crimp butt connector on preassembled wire end. *See repair instructions*
Crimping on stop parts

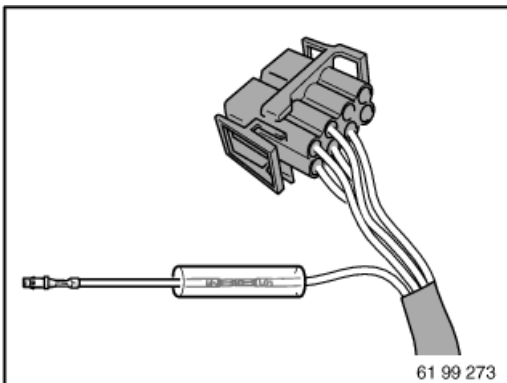




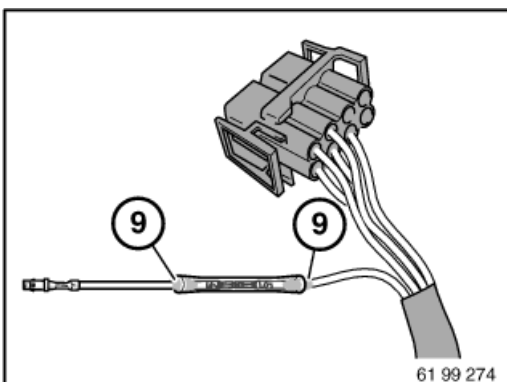
Push shrink-fit hose (8) onto free wire end.



Crimp unused wire end to butt connector.



Pull shrink-on sleeve over butt connector.



Important!

Do not burn shrink-on sleeve.

With hot air blower, shrink the shrink-on sleeve on both sides (9) of shrink-fit hose until glue emerges uniformly all round.

Insert contact in housing.

Close secondary lock on housing.



61 13 ... Butt connector for repairing a plug connection



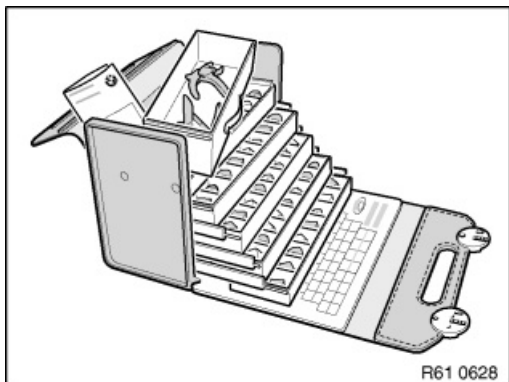
Special tools required:

- 61 0 300
- 61 4 340
- 61 0 240



Important!

1. Identify cause of damage (e.g. sharp-edged body components, faulty electrical loads, jammed mechanisms, corrosion caused by ingress of water, etc.).
2. Read out fault memory
3. Eliminate cause of damage.
4. Disconnect battery negative terminal
5. Make sure that no safety-related system according to circuit diagram (e.g. antilock braking system, active rear-axle kinematics, airbags, etc.) are influenced. Otherwise replace faulty wiring harness or use repair cable (sourcing reference: BMW Parts Department)
6. Carry out function test and read out fault memories again
7. Eliminate new faults if applicable and clear fault memories

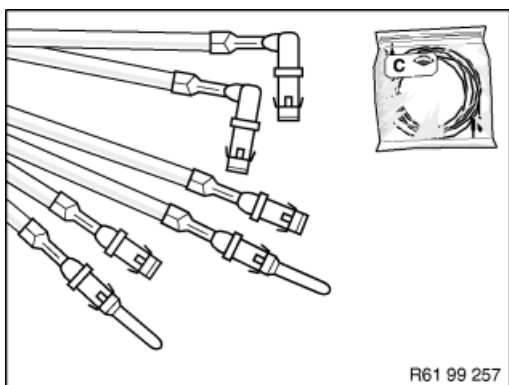


Note:

The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.

The case can no longer be ordered. Order individual parts for wiring harness repair through BMW Parts Department.

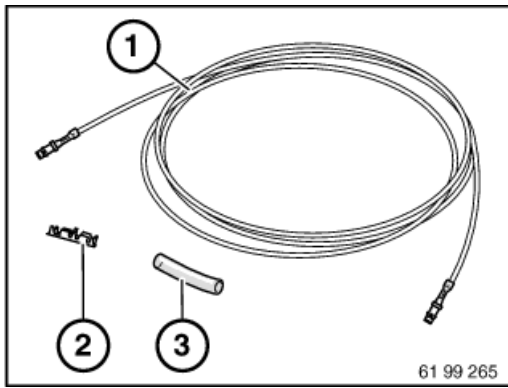
- Refer to Service Information:
SI 02 04 07 341



Choose repair kit.

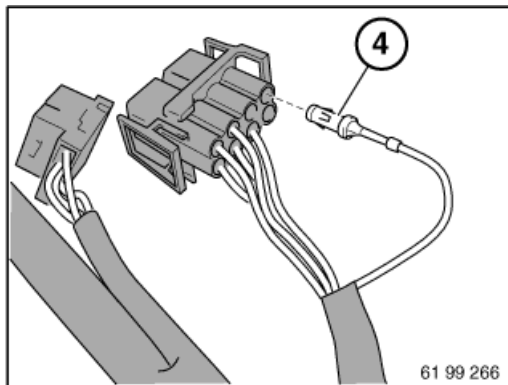
Example: Repair kit, circular connector system D 2.5.





Remove following parts:

- (1) Pre-packaged end of cable with requisite wire cross-section
- (2) Crimp connector for selected wire cross-section
- (3) Shrink-fit hose

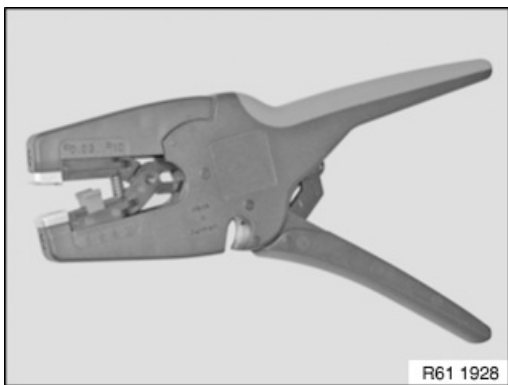


Open secondary lock on housing.

Mark damaged contact (4) with socket number of housing and press it out of housing using appropriate special tool contained in special tool set 61 0 300).

See repair instructions

Notes for opening contacts and locks of different plug contact systems.



Important!

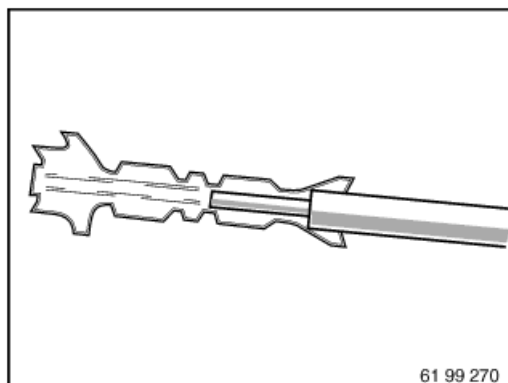
- Check maximum length of repair cable
- If more than one wire is to be repaired, the individual interfaces must be offset so that the wiring harness is not too thick at the repaired point.

Adhere to following procedure:

- Cut off wire with faulty contact at point which is easily accessible
- Strip insulation from end of wire at wiring harness end
- Cut preassembled wire end to length and strip insulation

Refer also to repair instruction:

Cutting to length and stripping insulation from cables



Crimp butt connector on preassembled wire end.

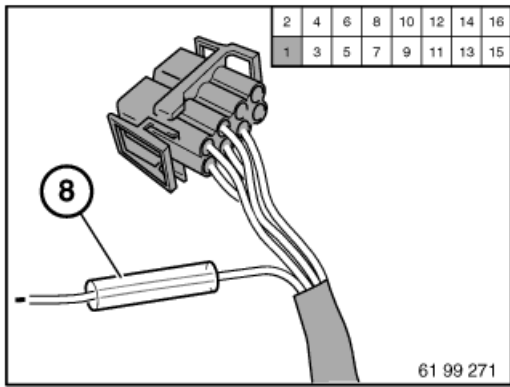
Special tools:

- 61 4 340 (0.35 - 2.5 sq mm)
- 61 0 240 (4.0 - 6.0 sq mm)

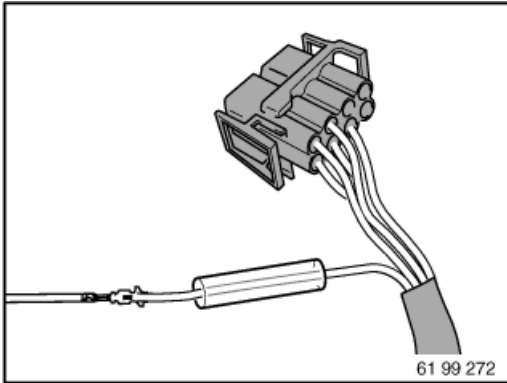
See repair instructions

Crimping on stop parts

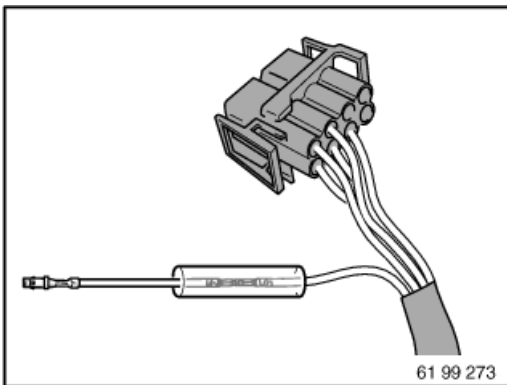




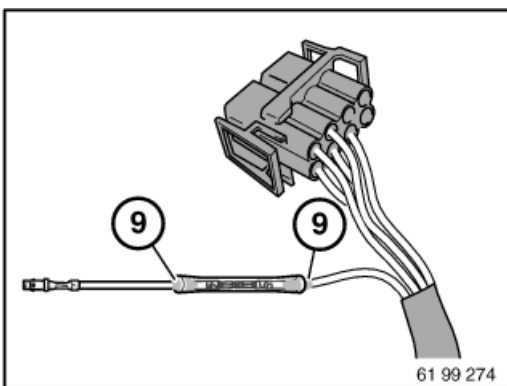
Push shrink-fit hose (8) onto free wire end.



Crimp unused wire end to butt connector.



Pull shrink-on sleeve over butt connector.



Important!

Do not burn shrink-on sleeve.

With hot air blower, shrink the shrink-on sleeve on both sides (9) of shrink-fit hose until glue emerges uniformly all round.

Insert contact in housing.

Close secondary lock on housing.

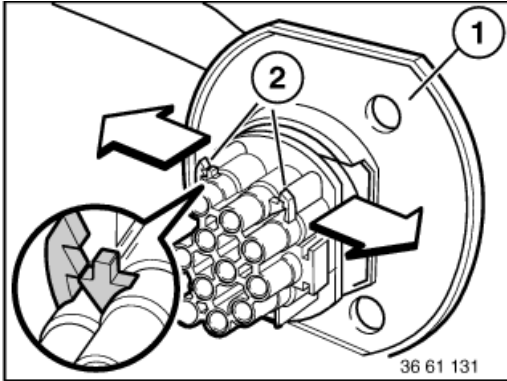


61 13 ... Circular connector, 13-pin, system D2.5



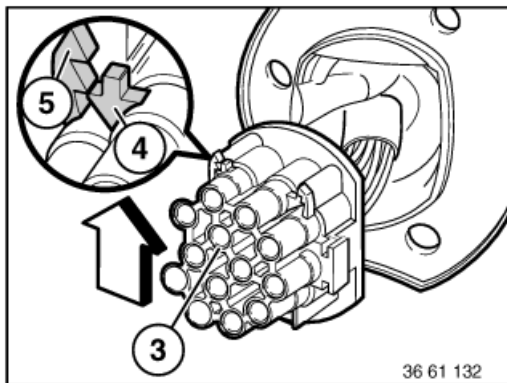
Special tools required:

- 61 0 303

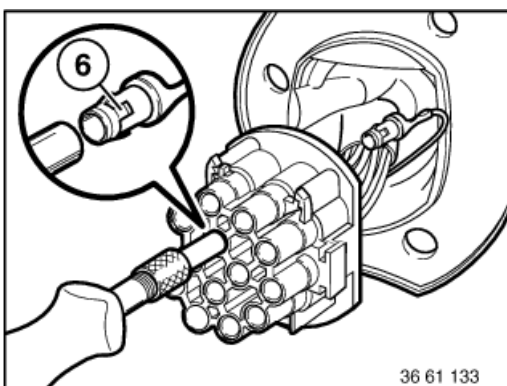


Pull off rubber grommet (1).

Carefully pull out lock (2) in direction of arrow.



Move lower section of connector (3) in direction of arrow until retaining lugs (4) snap into release groove (5).



With special tool 61 0 303, press down retaining lugs (6) of corresponding contact and pull out cable.

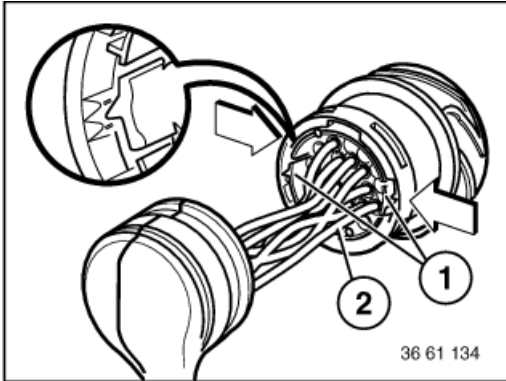


61 13 ... Circular connector, 20-pin, system D2.5

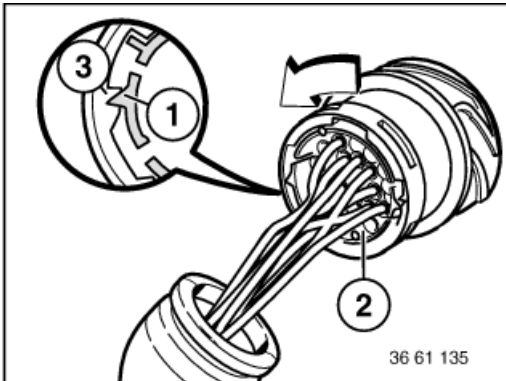


Special tools required:

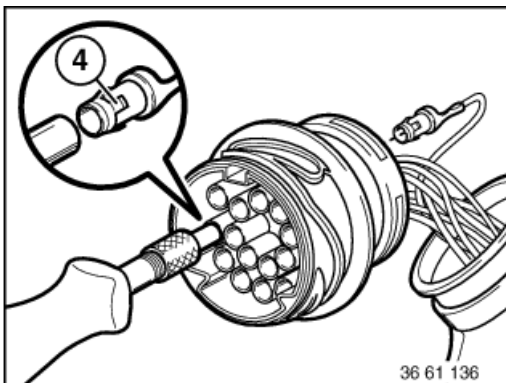
- 61 0 303



Carefully press back retaining tabs (1) of internal connector (2).



Turn internal connector (2) until retaining lugs (1) snap into release groove (3).



With special tool 61 0 303 press down retaining hook (4) of corresponding contact and pull out cable.

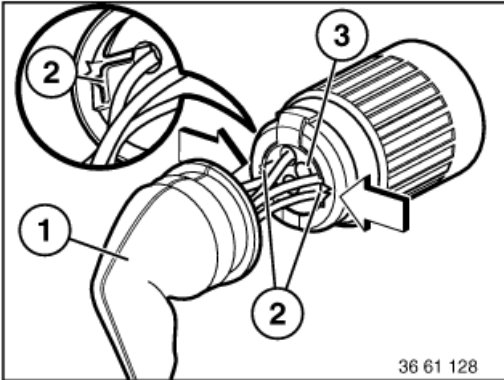


61 13 ... Circular connector, 7-pin, 8-pin, system D2.5



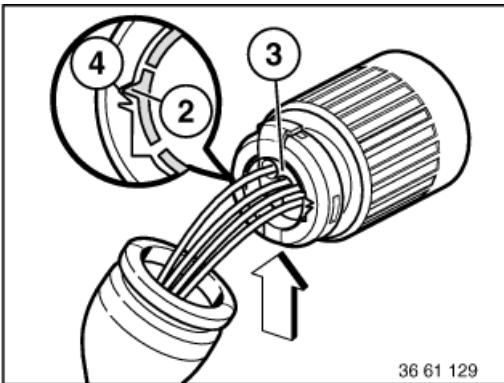
Special tools required:

- 61 0 303

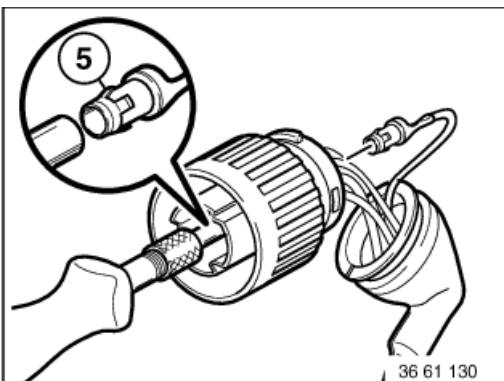


Carefully pull off rubber grommet (1).

Carefully press back retaining tabs (2) of internal connector (3).



Slide internal connector (3) in direction of arrow until retaining tabs (2) lock into locking groove (4).



Use special tool 61 0 303 (61 1 132) to press back retaining hook (5) of corresponding contact and pull out cable with contact.

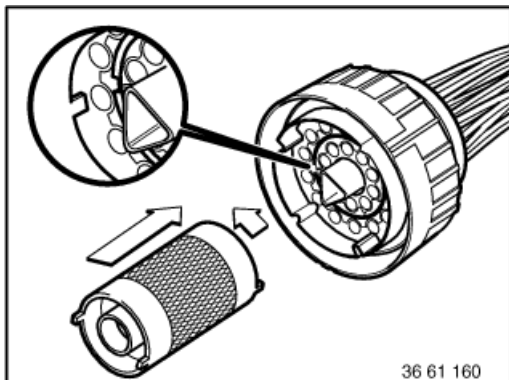


61 13 ... Circular plugs, 4-, 7-, 10- 12-, 25-pin, System D1.5/D2.5

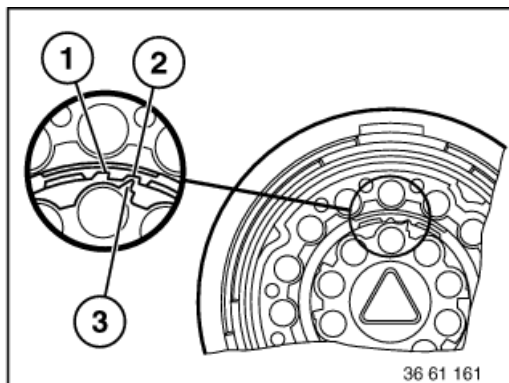


Special tools required:

- 61 0 303

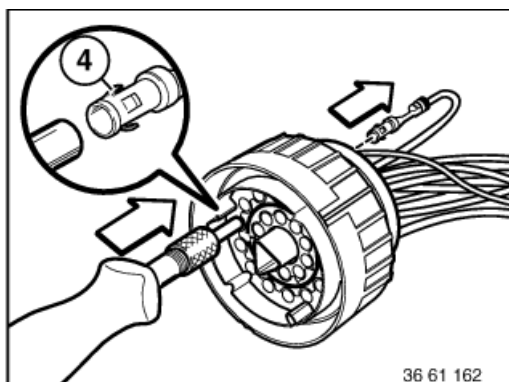


Insert special tool with suitable connection side in connector and twist approx. 3° anticlockwise.



The connector is locked down if retaining lug (3) is located in locking groove (2).

1. Unlocking groove
2. Locking groove
3. Retaining lug



With special tool 61 0 303 press back retaining hook(4) of corresponding contact and pull out cable with contact.

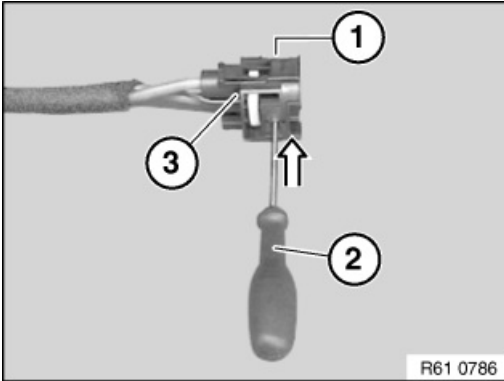


61 13 ... Connector housing, LCC contact (load current contact)



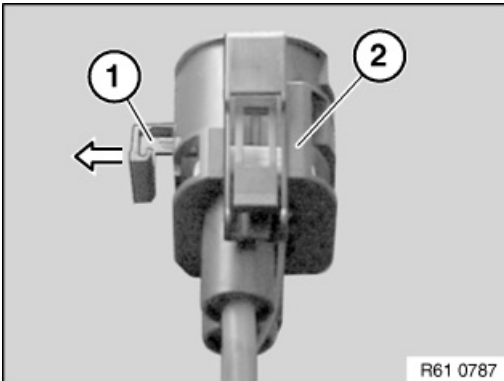
Special tools required:

- 61 0 317

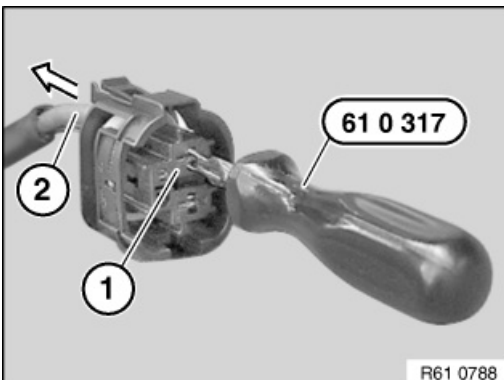


Socket housing:

Press lock (1) with suitable tool (2) in direction of arrow out of socket housing (3).

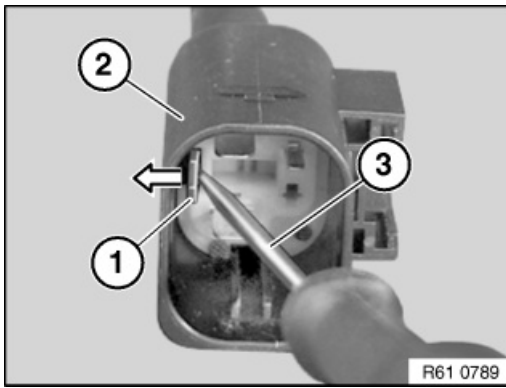


Pull lock (1) out of socket housing (2).



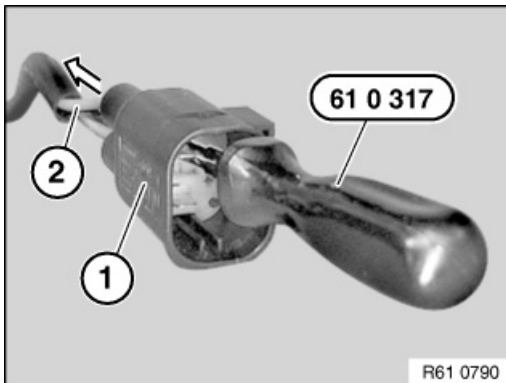
Insert special tool 61 0 317 into socket housing (1) and pull out wiring with LCC contact (2) in direction of arrow.





Pin housing:

Unlock locking slide (1) of pin housing (2) with suitable tool (3) in direction of arrow.



Insert special tool 61 0 317 into pin housing (1) and pull out wiring with LCC contact (2) in direction of arrow.

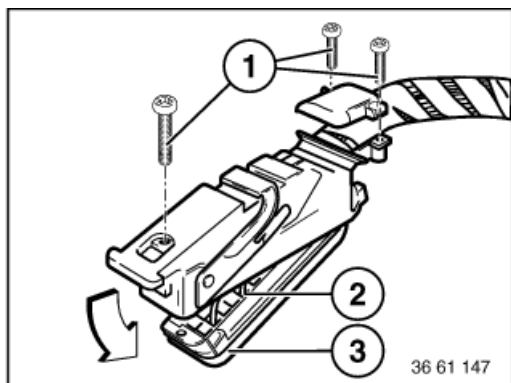


61 13 ... Control unit plugs, 25-, 35-, 55-, 83-, 88-pin



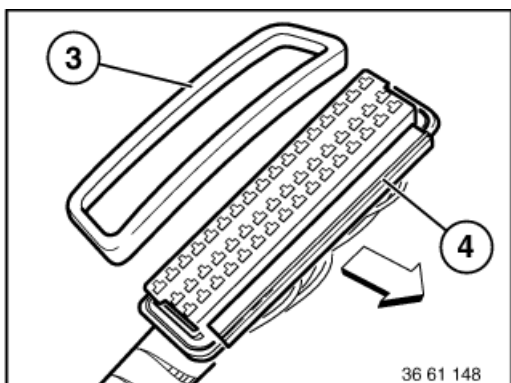
Special tools required:

- 61 0 312
- 61 0 314
- 61 0 315
- 61 0 323



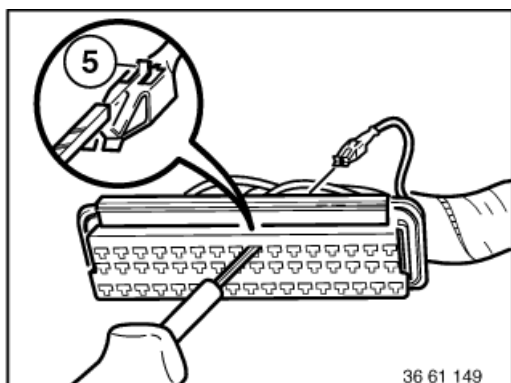
Release screws (1).

Lever out pin sensor (2) with gasket (3) in direction of arrow.



Remove gasket (3).

Pull out housing lock (4) in direction of arrow and unlock.

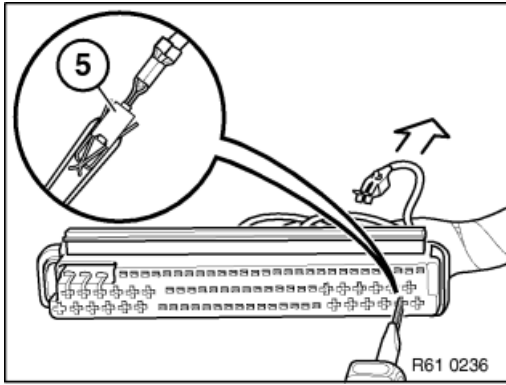


Press down retaining hook (5) of corresponding contact and pull out cable with contact.

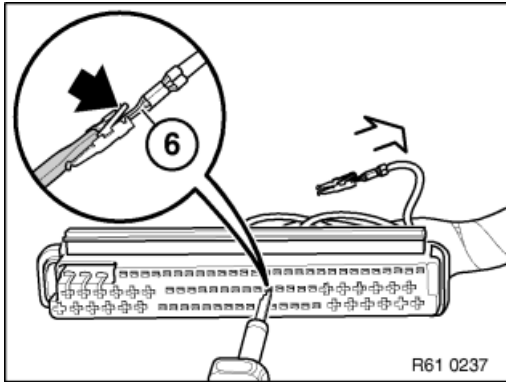
Special tool 61 0 312 (61 1 134) for mini flat spring contacts.

Special tool 61 0 314 (61 1 135) for mini flat spring contacts.





Special tool 61 0 315 (61 1 151) for double flat spring contacts (dual retaining hooks).



Special tool 61 0 323 (61 1 152) for double flat spring contacts (special retaining hook).



**Special tools required:**

- 61 4 320

**Crimping annular contacts:**

Special tool 61 4 320

Handling:

Refer to Service Information:

- SI 2 04 06 2939

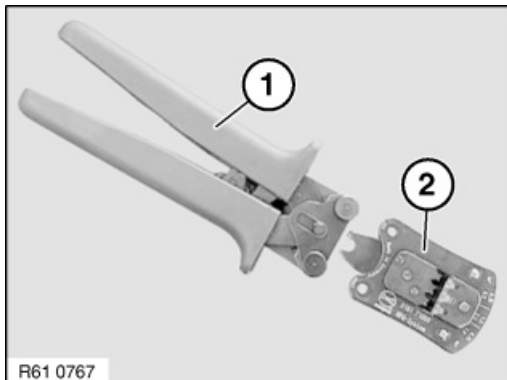


61 13 ... Crimping Micro Power Quadlock contacts (MPQ)

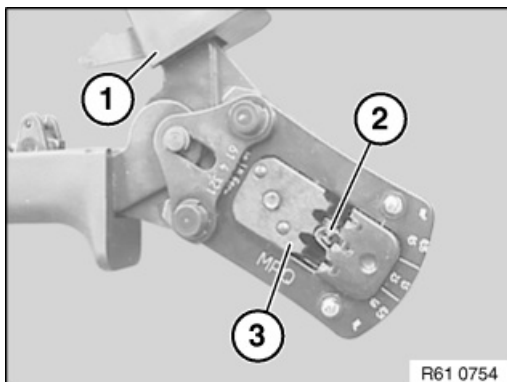


Special tools required:

- 61 4 320



To crimp MPQ contacts, use hand pliers 61 4 321 (1) in conjunction with crimping head 61 4 325 (2) from crimping set 61 4 320. *Note:* Hand pliers (1) open automatically until limit position when handles are pressed together.



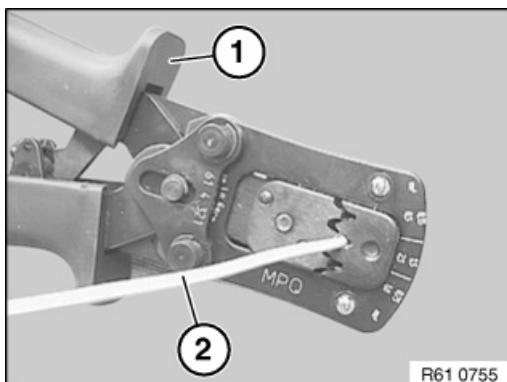
Open hand pliers (1).

Note:

Place contact (2) with utmost care in designated nest (observe line cross-section) in crimping head (3). Make sure it is exactly positioned.

Place MPQ contact (2) in crimping head (3).

Close hand pliers (1) one notch.



Note:

Follow procedure for cutting and stripping insulation from cables.

Insert stripped cable (2).

Close hand pliers (1) fully.

Open hand pliers (1) and remove cable (2).

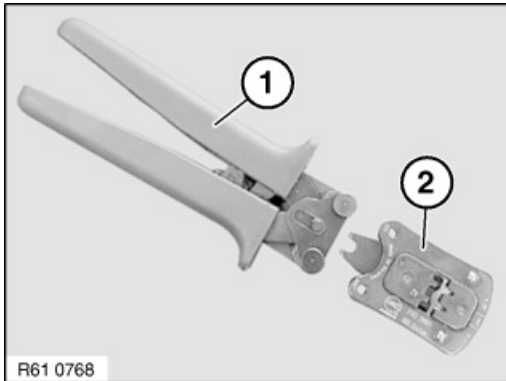
Important!

Check contact for correct crimping.

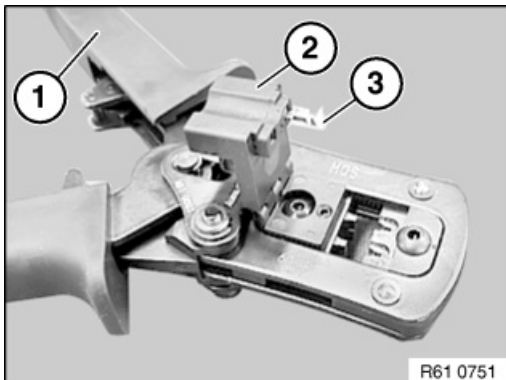


**Special tools required:**

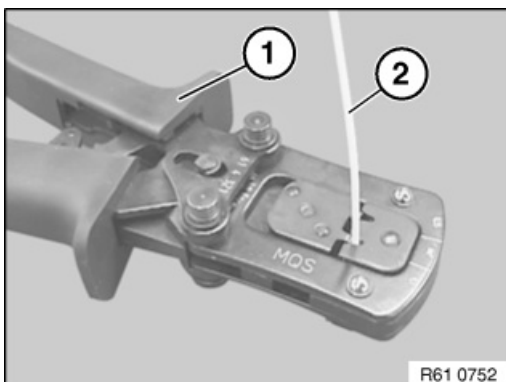
- 61 4 320



To crimp MPQ contacts, use hand pliers 61 4 321 (1) in conjunction with crimping head 61 4 324 (2) from crimping set 61 4 320. *Note:* Hand pliers (1) open automatically until limit position when handles are pressed together.



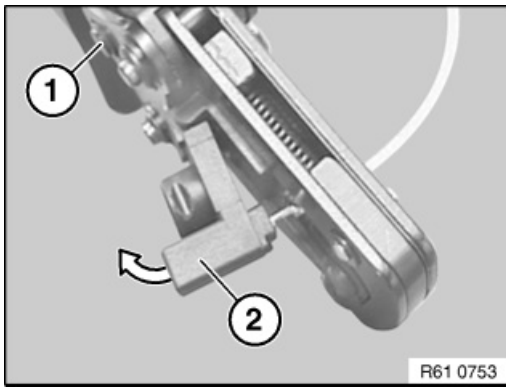
Open hand pliers (1).
Fold up contact carrier (2).
Insert MQS contact (3) in contact carrier (2).
Fold back contact carrier (2).



Note:
Follow procedure for cutting and stripping insulation from cables.

Close hand pliers (1) one notch.
Insert stripped cable (2).
Close hand pliers (1) fully.





Open hand pliers (1).

Open contact carrier (2) gently and carefully remove MQS contact.

Important!

Check contact for correct crimping.

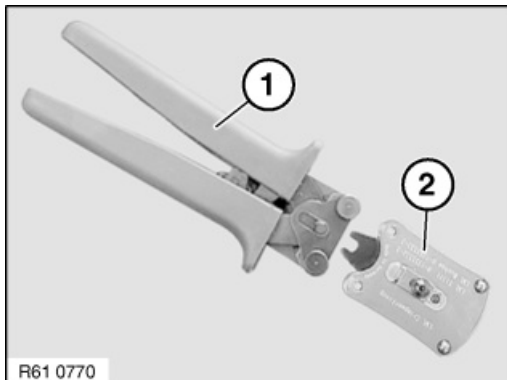


61 13 ... Crimping optical fibres

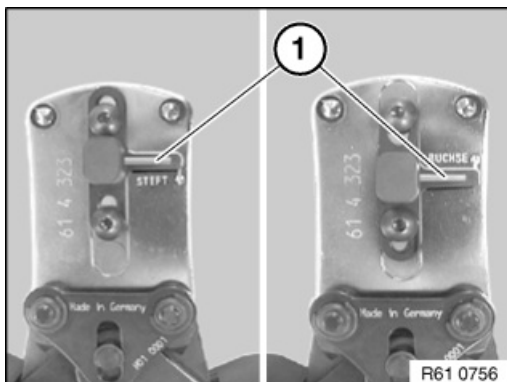


Special tools required:

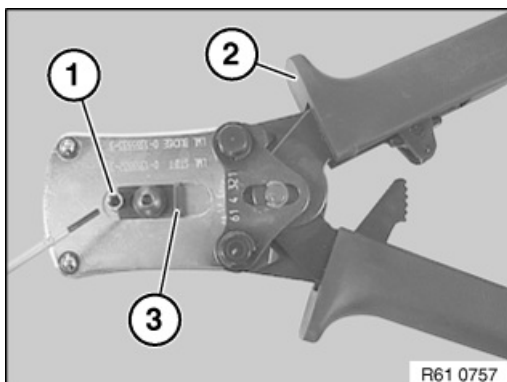
- 61 4 320



To crimp optical fibres, use hand pliers 61 4 321 (1) in conjunction with crimping head 61 4 323 (2) from crimping set 61 4 320. *Note:* Hand pliers (1) open automatically until limit position when handles are pressed together.



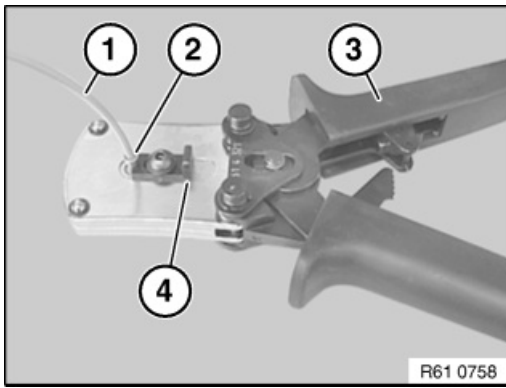
Move contact guide by means of stop lever (1) into corresponding position (pin contact or jack).



Open hand pliers (2).

Place pin contact or jack (1) in crimping head and secure with locking lever (3).





Note:

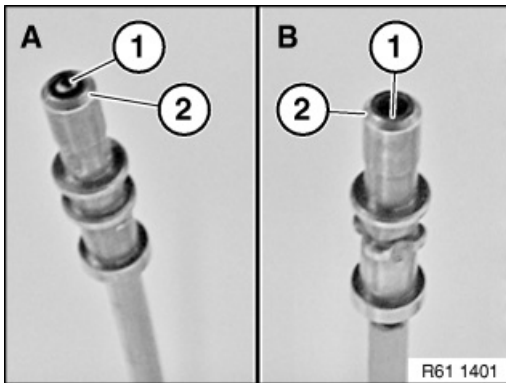
Follow procedure for cutting and stripping insulation from optical fibres.

Insert stripped optical fibre (1) until limit position into pin contact or jack (2).

Close hand pliers (3) fully.

Open hand pliers (3) and locking lever (4).

Remove optical fibre (1).



Attention!

Make sure optical fibre is correctly seated in jack.

Right (A)

End of optical fibre (1) must be flush with tip of pin contact (2).

Wrong (B)

End of optical fibre (1) is not flush with tip of pin contact (2).



61 13 ... Crimping stop parts



Special tools required:

- 12 1 080
- 12 1 081
- 12 1 083



Spare parts for in-car electronics (housing and contacts):

Refer to Service Information:

SI 2 04 07 341



1. Crimping butt connectors and contact sleeves for comb connectors up to 2.5 mm

Refer to Service Information:

SI 2 04 06 293

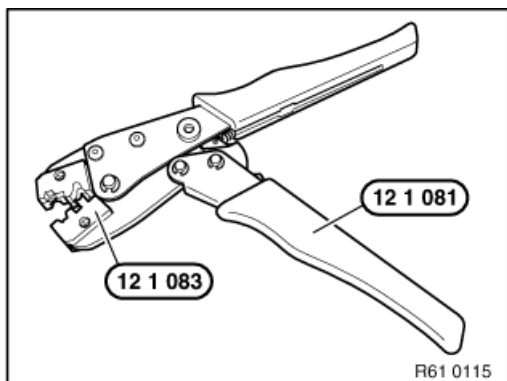


2. Crimping butt connectors and contact sleeves for comb connectors larger than 2.5 mm²

Refer to Service Information:

SI 2 02 05 194

SI 2 07 05 233



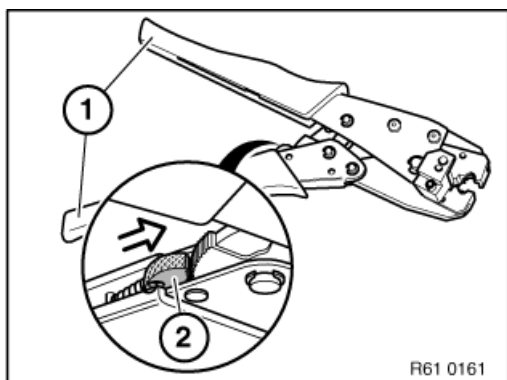
3. Crimping contact sleeves for 4 mm² comb connectors and ignition cable contacts

Use special tool kit 12 1 080 to attach ignition cable contacts and crimp 4 mm² contact sleeves for comb connectors.

- 12 1 081 (hand pliers)
- 12 1 083 (nest)

See repair instructions

Special tools for wiring harness repairs.



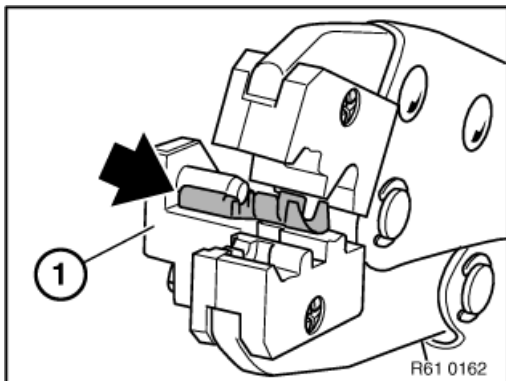
Release special tool 12 1 081 :

Squeeze grips (1) lightly and push release lever (2) in direction of arrow.

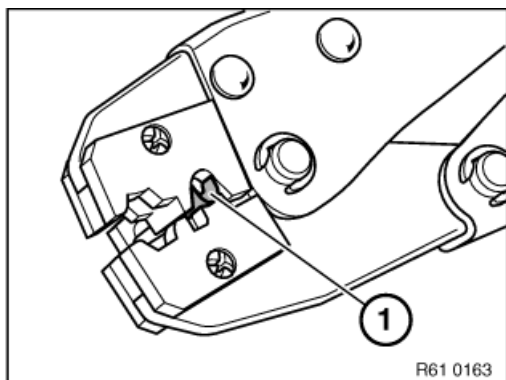
Or:

Compress handles until limit position, hand pliers unlock automatically.

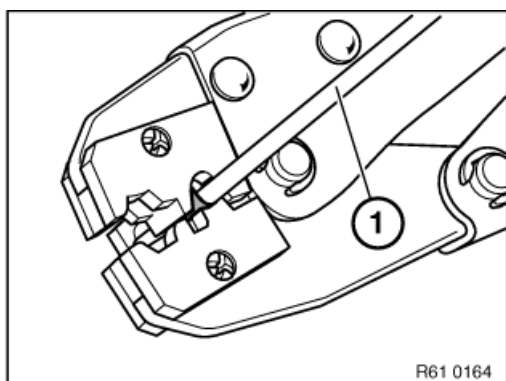




Place 4 mm² contact sleeve in nest with anti-twist safeguard (1) as far as possible.



Preload contact by squeezing matrix in crimping tool. Grip contact (1) firmly only, do not crimp.



Note:

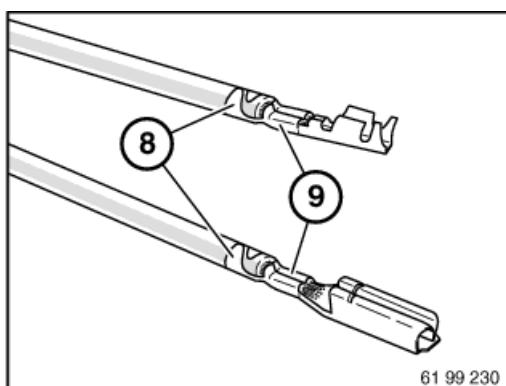
Follow procedure for cutting and stripping insulation from cables.

Insert stripped end of wire (7) in the contact. Ensure insulation and stripped wire end are correctly laid in contact.

Compress crimping tool to limit position.

Crimping tool unlocks automatically.

Take contact out of crimping tool.



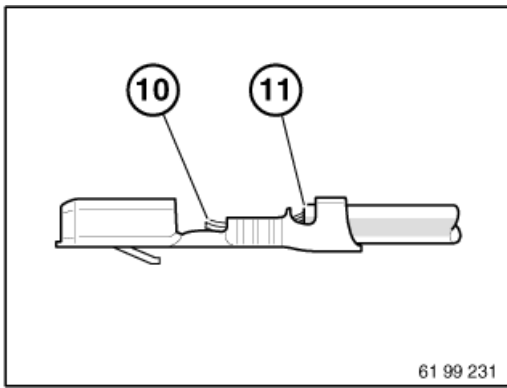
4. Checking crimping

Check insulation crimping (8) and wire crimp (9) against following illustrations to ensure crimps are correctly located.

Note:

Illustration shows butt connectors and contact sleeves for comb connectors knocked on one side. The crimping procedure is identical here.

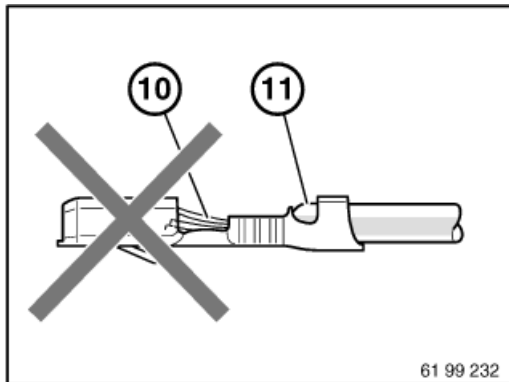




Correct crimping:

Visible conductor end (10).

Visible insulation end (11).

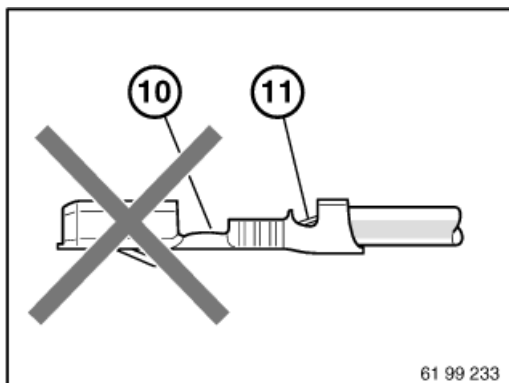


Incorrect crimping:

Conductor end (10) inserted too far.

Insulation end (11) in wire crimp.

If necessary, repeat crimping with a new contact.



Incorrect crimping:

Conductor end (10) not visible.

Insulation end (11) not visible.

If necessary, repeat crimping with a new contact.





Special tools required:

- 0 494 159
- 0 496 849
- 0 496 833
- 2 407 379
- 61 4 320
- 61 4 340
- 61 0 210
- 61 0 220
- 61 0 230



Necessary preliminary work:

- Notes for opening contacts and locks of different connector systems.
- Cutting cables to length and strip insulation

Special tools for wiring harness repair.

New part for vehicle electrical system (stops and housing):

- Sourcing reference: BMW Group Parts
- Refer to Service Information SI 2 04 07 341



1. Crimping of NanoMQS stops (only G11; G12)

Crimping of NanoMQS contacts (MQS).

- Special tool handle 0 494 159 or 0 496 849
- Special tool (die-plate) 0 496 833
- Stripping tool 2 407 379



2. Crimping of stops up to 2.5 mm²

Crimping Micro Quadlock System contacts (MQS).

- Special tool 61 4 320

Crimping Micro Power Quadlock contacts (MPQ).

- Special tool 61 4 320

Crimping miscellaneous stop parts up to 2.5 mm²

- Special tool 61 4 340 (up to 03/2010 SWZ 61 4 328)

Refer to Service Information SI 2 04 06 293





3. Crimping of stops above 2.5 mm²

Crimping load current contacts (LSK 8).

- Special tool 61 0 210

Crimping SLK 2.8.

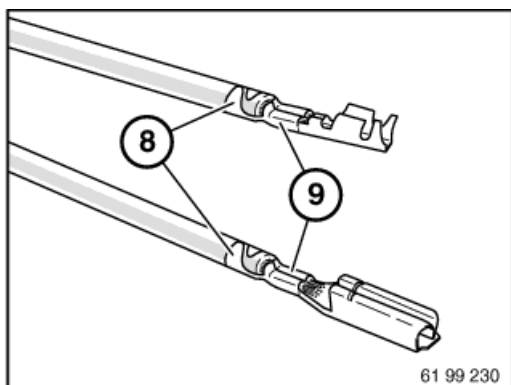
- Special tool 61 0 220

Refer to Service Information SI 2 02 05 194

Crimping double spring contact (DFK 40)

Crimping MAK 8

- Special tool 61 0 230
- Refer to Service Information SI 2 07 05 233

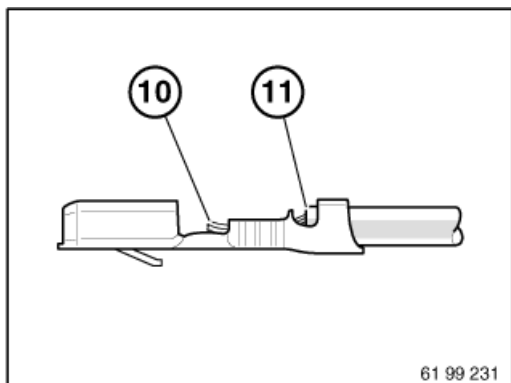


Checking crimping

Check insulation crimping (8) and wire crimp (9) against following illustrations to ensure crimps are correctly located.

Note:

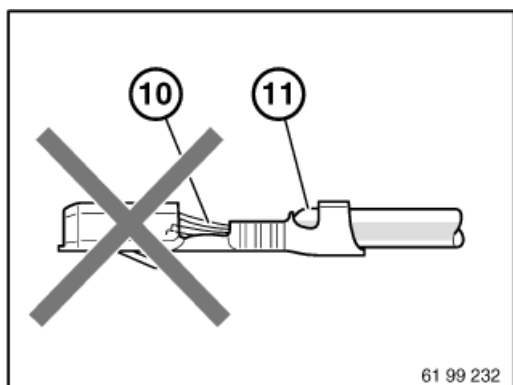
Illustration shows butt connectors and contact sleeves for comb connectors knocked on one side. The crimping procedure is identical here.



Correct crimping:

Visible conductor end (10).

Visible insulation end (11).



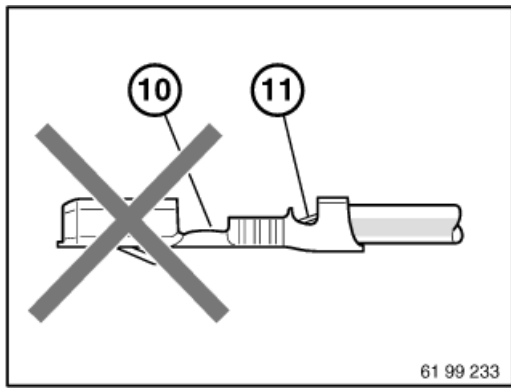
Incorrect crimping:

Conductor end (10) inserted too far.

Insulation end (11) in wire crimp.

If necessary, repeat crimping with a new contact.





Incorrect crimping:

Conductor end (10) not visible.

Insulation end (11) not visible.

If necessary, repeat crimping with a new contact.

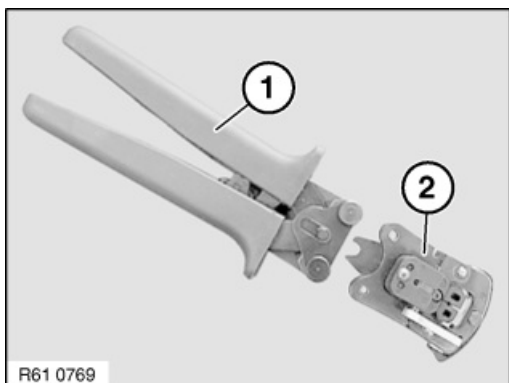


61 13 ... Cutting off, stripping insulation and cutting optical fibres to length

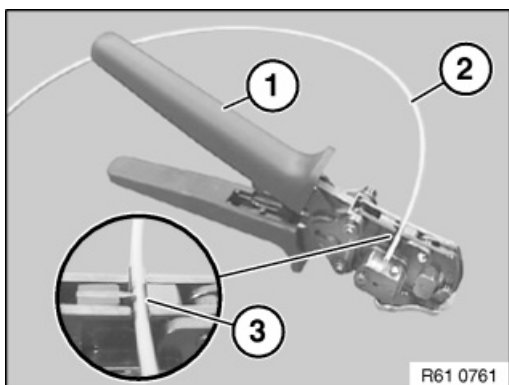


Special tools required:

- 61 4 321
- 61 4 329
- 61 4 320
- 61 4 323

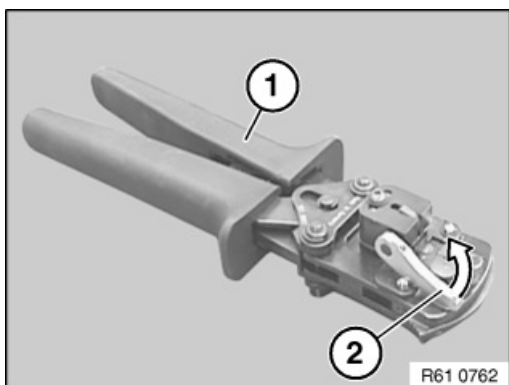


The hand pliers 61 4 321 (1) in connection with the crimping head 61 4 329 (2) from crimp kit 61 4 320 are used for cutting, strip insulation and cutting optical fibres to size. *Note:* Hand pliers (1) open automatically until limit position when handles are pressed together.



Cutting optical fibre

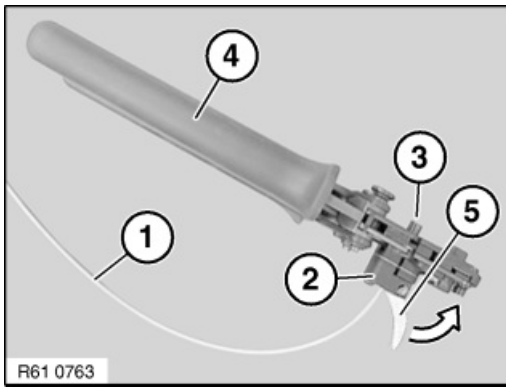
Open hand pliers (1).
Place optical fibre (2) in cutting device (3).
Close pliers (1) and remove optical fibre (2).



Stripping insulation from optical fibre

Open hand pliers (1).
Open lever (2) in direction of arrow.





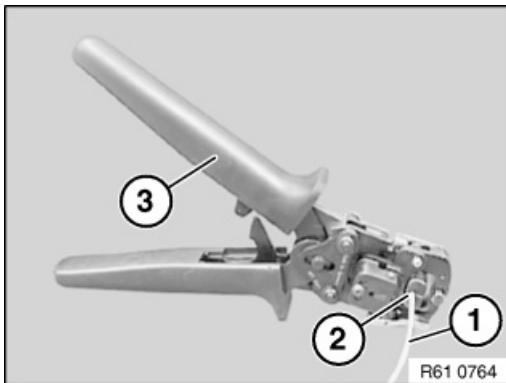
Push the optical fibre (1) into the strip insulation equipment (2) until it is flush in this area (3).

Close hand pliers (4) fully.

Close the operating lever (5) in the direction of the arrow.

Open hand pliers (4) by one tooth notch.

Re-open the operating lever (5) against the direction of the arrow and remove the optical fibre (1).



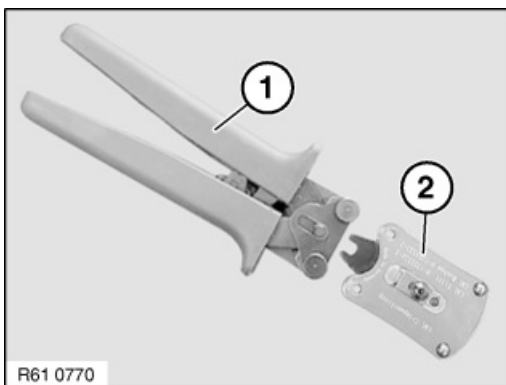
Cutting optical fibre to length

Open hand pliers (3).

Push the optical fibre (1) into the cutting equipment (2) until the insulation of the optical fibre (1) comes into contact with the clamping fixture.

Close hand pliers (3) fully and keep closed.

Remove optical fibre (1).

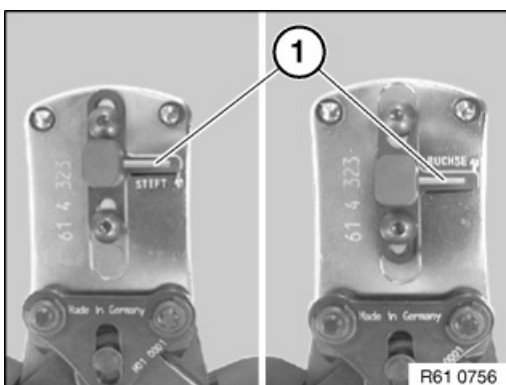


Crimp optical fibre

The hand pliers 61 4 321 (1) in connection with the crimping head 61 4 323 (2) from crimping kit 61 4 320 are used for crimping the optical fibres to size.

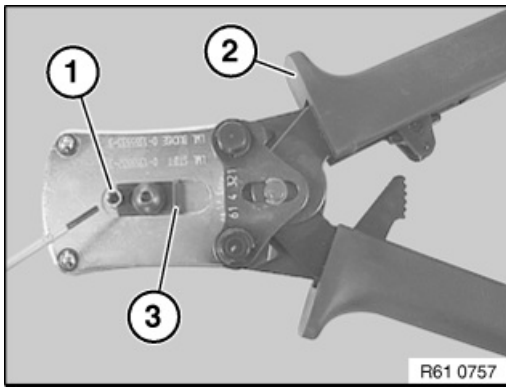
Note:

Hand pliers (1) open automatically until limit position when handles are pressed together.



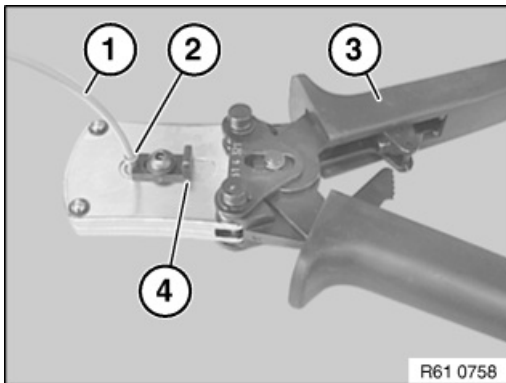
Move contact guide by means of stop lever (1) into corresponding position (pin contact or jack).





Open hand pliers (2).

Place pin contact or jack (1) in crimping head and secure with locking lever (3).

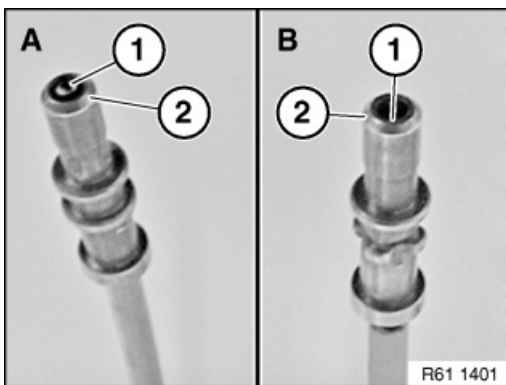


Insert stripped optical fibre (1) until limit position into pin contact or jack (2).

Close hand pliers (3) fully.

Open hand pliers (3) and locking lever (4).

Remove optical fibre (1).



Caution!

Make sure optical fibre is correctly seated in jack.

Right (A)

End of optical fibre (1) must be flush with tip of pin contact (2).

Wrong (B)

End of optical fibre (1) is not flush with tip of pin contact (2).





For cutting cables to length and stripping insulation, refer to Service Information:

SI 2 07 11 721

Stripped length:

Wire cross-section (mm ²)	Stripped length (mm)
0,35 ... 0,50	4,0
0,75 ... 1,00	4,5
1,00 ... 2,50	5,0





For cutting cables to length and stripping insulation, refer to Service Information:

SI 2 07 11 721

Stripped length:

Wire cross-section (mm ²)	Stripped length (mm)
0,35 ... 0,50	4,0
0,75 ... 1,00	4,5
1,00 ... 2,50	5,0

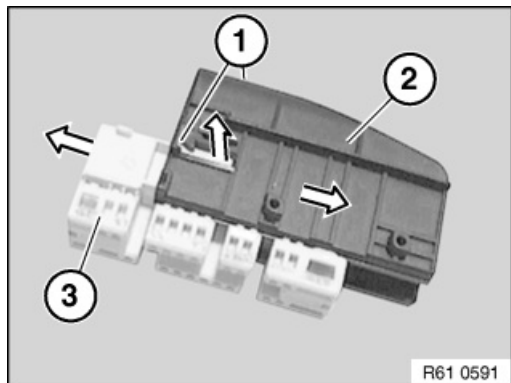


61 13 ... In-line connectors, 24-/44-pin, Hybrid System MQS/MPQ



Manufactured by AMP: The following contact types without strand sealing can be fitted in the connector housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)



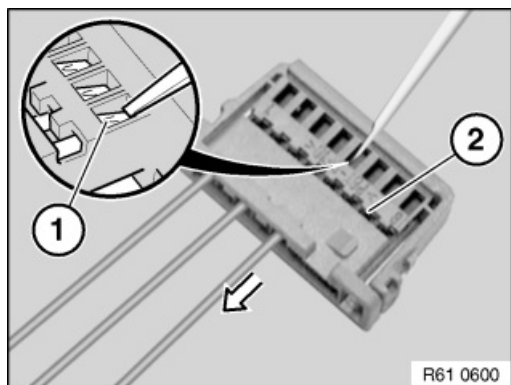
Socket housing:

Press locks (1) on protective cap (2) upwards on both sides.

Detach protective cap from contact carrier (3).

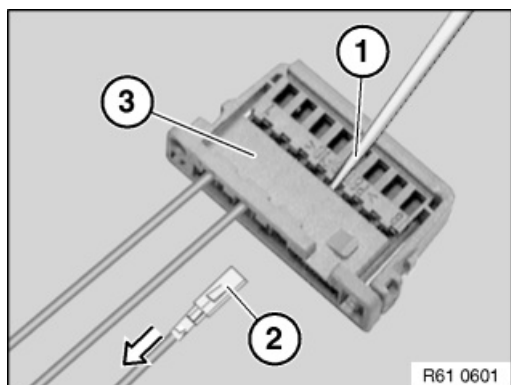
Note:

Detaching the protective cap releases the secondary locks of the socket contacts.



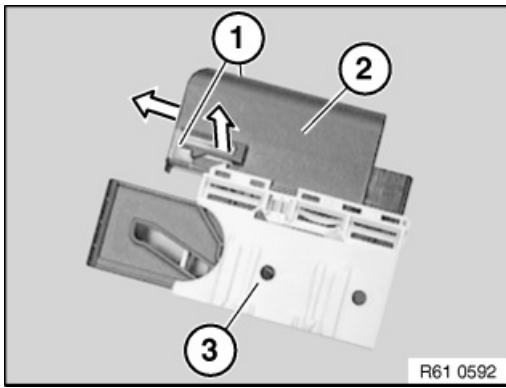
Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

Pull wire with socket contact in direction of arrow as far as secondary lock (2).



Hold down retaining hook in secondary lock (1) again and pull cable with socket contact (2) completely out of contact carrier (3).





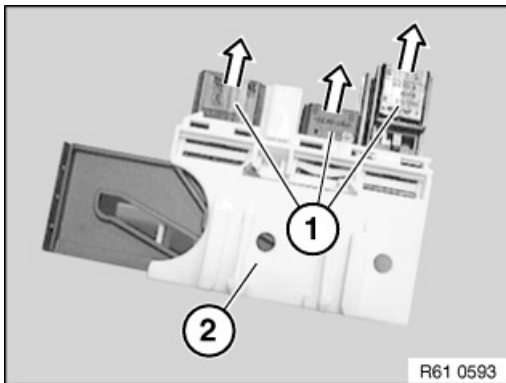
Pin housing:

Press locks (1) on protective cap (2) upwards on both sides.

Detach protective cap from housing carrier (3).

Note:

Detaching the protective cap releases the secondary locks of the pin contacts in the contact carriers.



Pull contact carrier (1) out of housing carrier (2).

The pin contacts are pulled out of a contact carrier as described under "Socket housing".

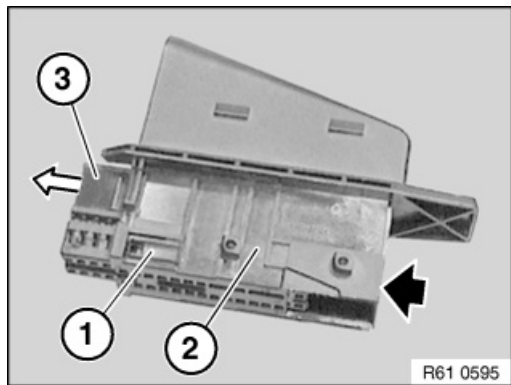


61 13 ... In-line connectors, 30-pin, Hybrid System MQS/MPQ



Manufactured by AMP: The following contact types without strand sealing can be fitted in the connector housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)



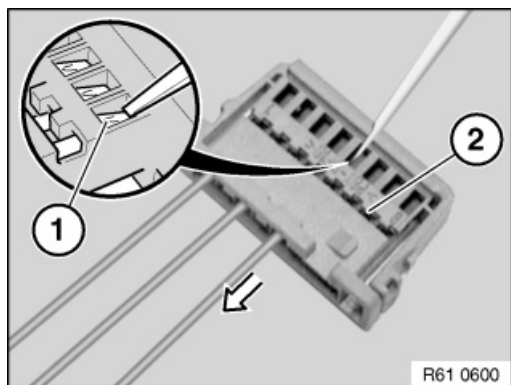
Socket housing:

Raise lock (1) on housing (2).

Push contact carrier (3) out of housing (2).

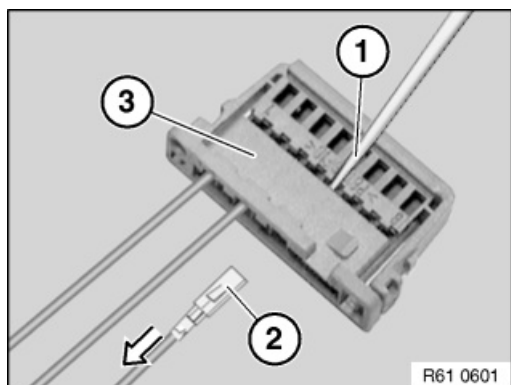
Note:

Pushing out the contact carrier releases the secondary locks of the socket contacts.



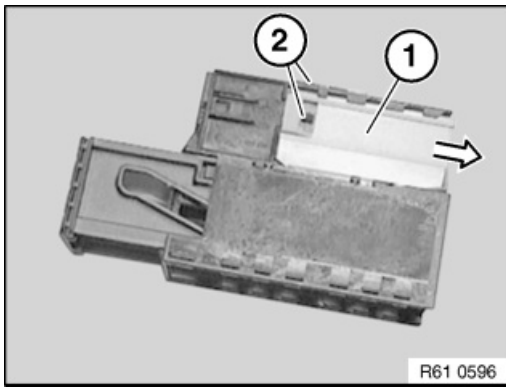
Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

Pull wire with socket contact in direction of arrow as far as secondary lock (2).



Hold down retaining hook in secondary lock (1) again and pull cable with socket contact (2) completely out of contact carrier (3).





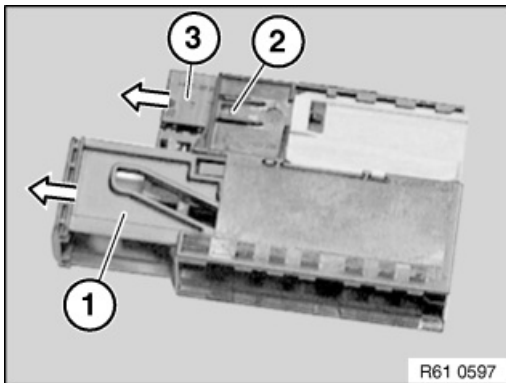
Pin housing:

Contacts 1 ... 13 and 19 ... 27:

Raise locking slide (1) on both sides (2) of housing and detach.

Note:

Detaching the locking slide releases the secondary locks of the pin contacts.



Contacts 14 ... 18 and 28 ... 30:

Pull slide (1) outwards completely.

Raise lock (2) on housing.

Pull contact carrier (3) out of housing.

Note:

Pulling out the contact carrier releases the secondary locks of the pin contacts.



The pin contacts are pulled out of a contact carrier as described under "Socket housing".

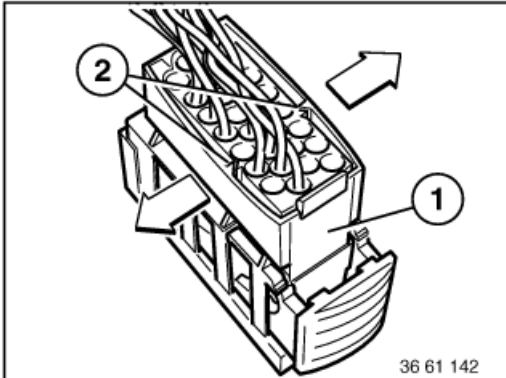


61 13 ... In-line connectors, 30-pin, System D2.5

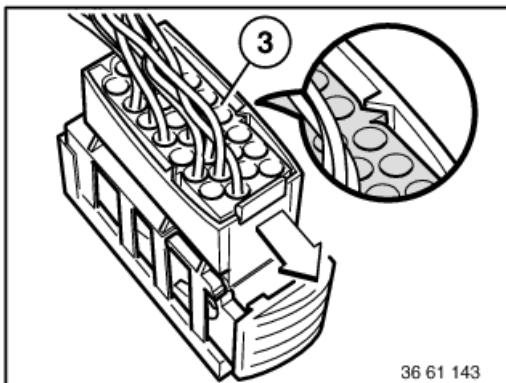


Special tools required:

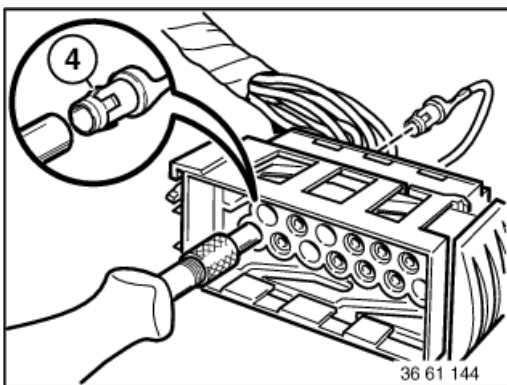
- 61 0 303



Carefully pull external connector (1) in area of retaining lugs (2) apart slightly.



Pull internal connector (3) until limit position in direction of arrow.



With special tool 61 0 303 press back retaining hook(4) of corresponding contact and pull out cable with contact.

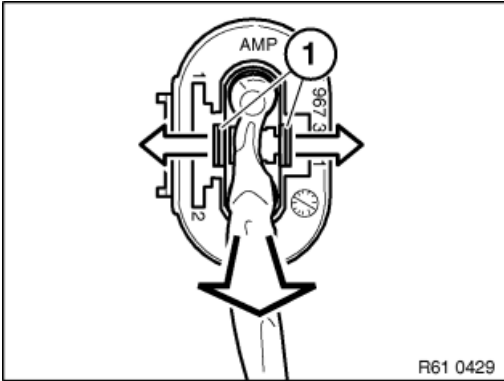


61 13 ... In-line plugs, 2-pin, System JPT ELA

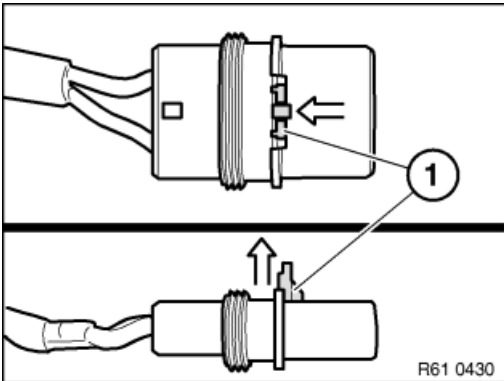


Special tools required:

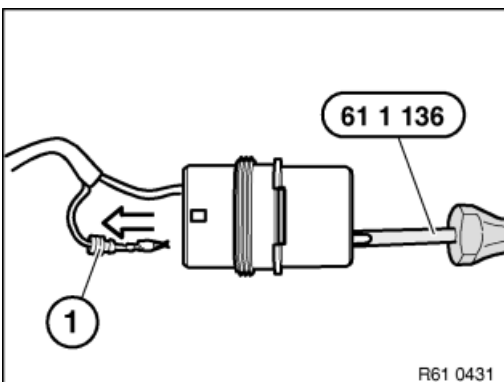
- 61 0 316



Press lock (1) in direction of arrow and slide connector forward.



Press lock (1) downward and slide out to one side.



With special tool 61 0 316 (61 1 136), unlock contact and pull out cable with contact (1) towards rear.

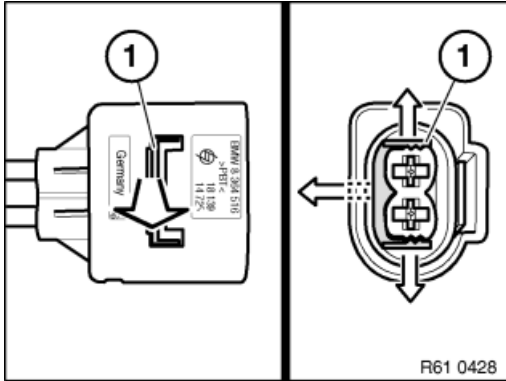


61 13 ... In-line plugs, 2-pin, System MDK 3 plus 2.8

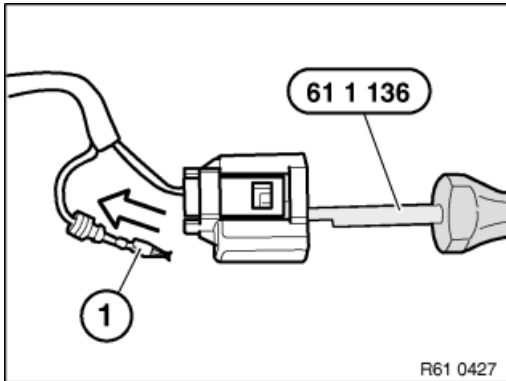


Special tools required:

- 61 0 316



Unlock lock (1) on outside at retaining hook and slide out lock (1) to side.



With special tool 61 0 316 (61 1 136), unlock contact and pull out cable with contact (1) towards rear.

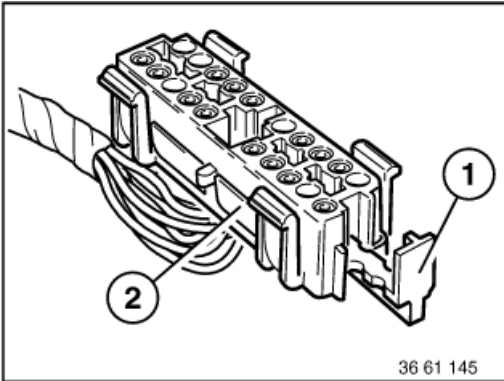


61 13 ... In-line plugs, 20-pin, System D2.5

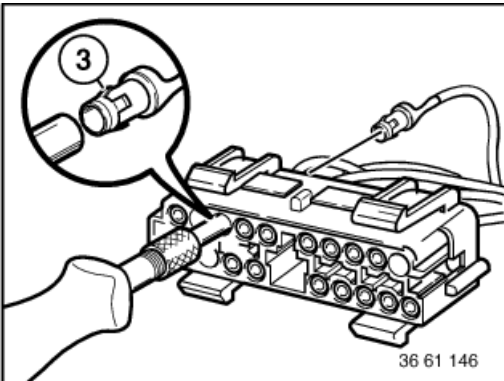


Special tools required:

- 61 0 303



Pull locking slide (1) out of connector (2).



With special tool 61 0 303 , press down retaining hook (3) of corresponding contact and pull out cable with contact.

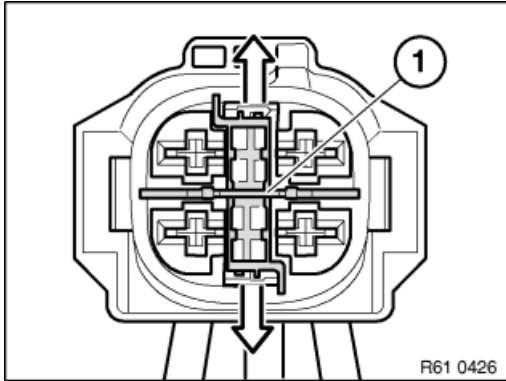


61 13 ... In-line plugs, 4-pin, System DFK ELA

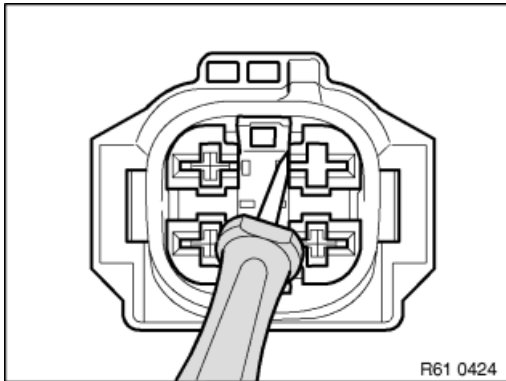


Special tools required:

- 61 0 316

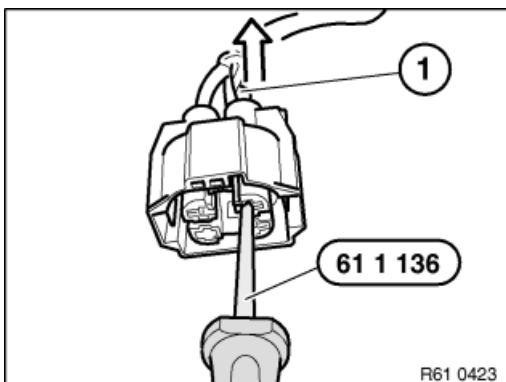


Press retaining hook in direction of arrow and remove lock (1).



Installation notes:

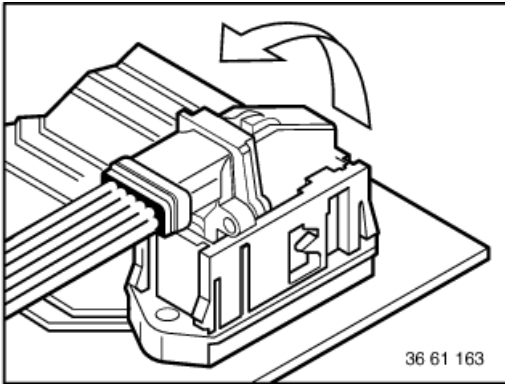
If necessary, side lock must also be unlocked with screwdriver.



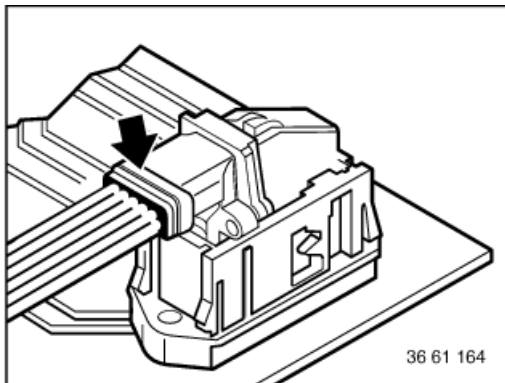
With special tool 61 0 316 (61 1 136), unlock contact and pull out cable with contact (1) towards rear.



61 13 ... In-line plugs, 6- to 50-pin, System Elo

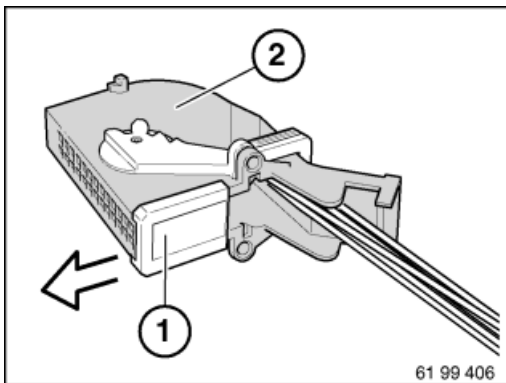


Open lock.

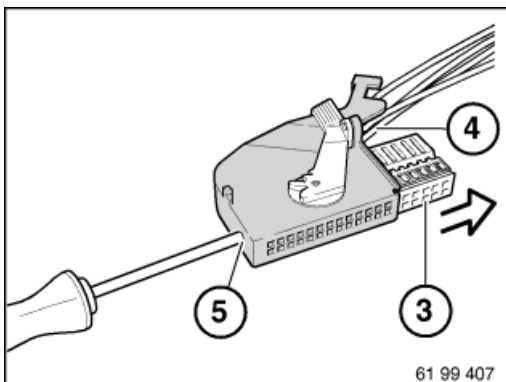


Detach cable strap.

Installation note:
Cable strap must be reinstalled.

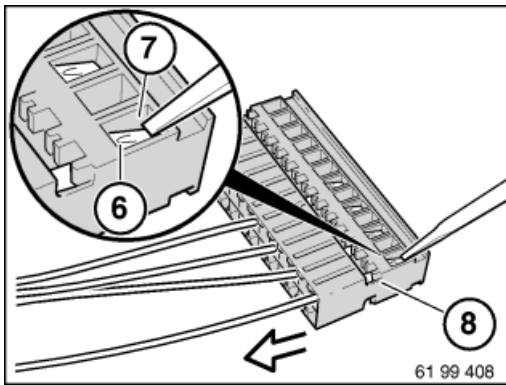


Detach catch (1) from connector housing (2).

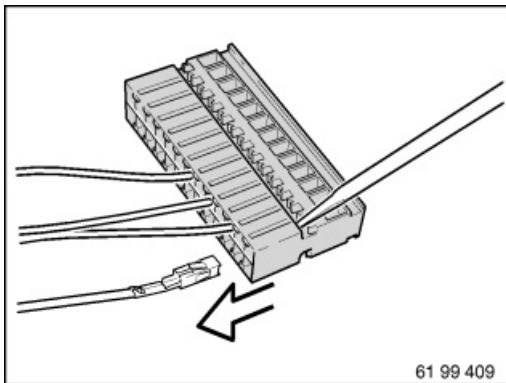


Press out contact carrier (3) with wiring harness (4) through opening (5).





Hold down retaining hook (6) of defective contact and pull cable and contact up to secondary lock (8).



Hold down retaining hook once again in secondary lock (8) and pull cable and contact completely out of contact carrier.

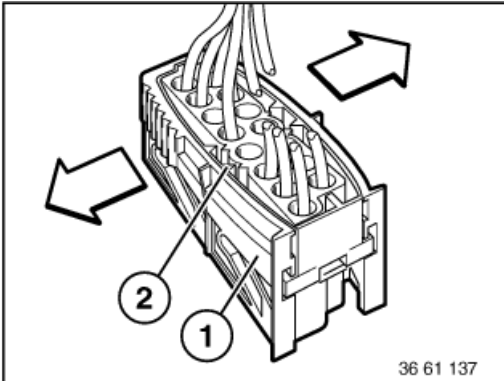


61 13 ... Inline connectors, 15-pin, System D2.5

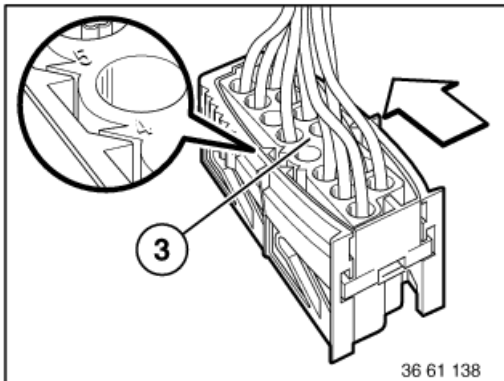


Special tools required:

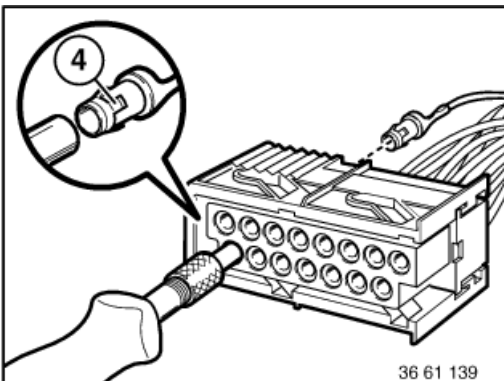
- 61 0 303



Carefully pull external connector (1) in area of retaining lugs (2) apart slightly.



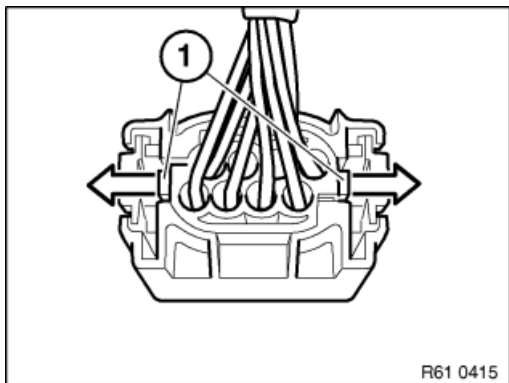
Pull internal connector (3) until limit position in direction of arrow.



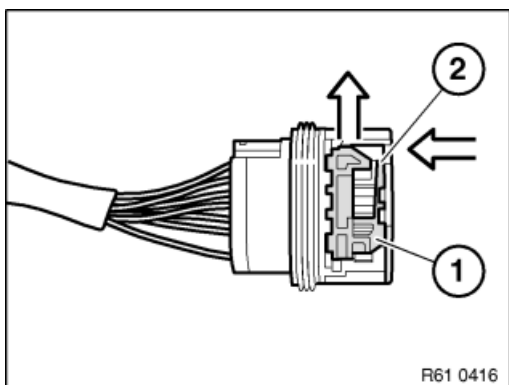
With special tool 61 0 303 press back retaining hook(4) of corresponding contact and pull out cable with contact.



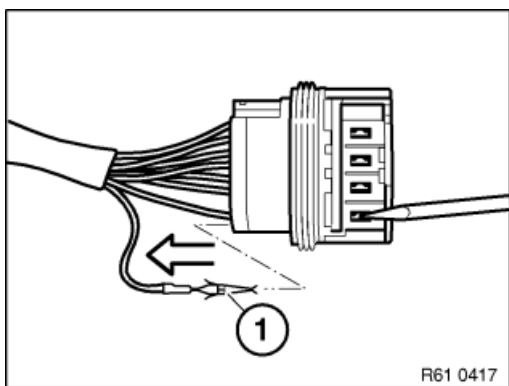
61 13 ... Inline connectors, 6-, 8-pin, System MQS



Press lock (1) in direction of arrow and slide connector forward.



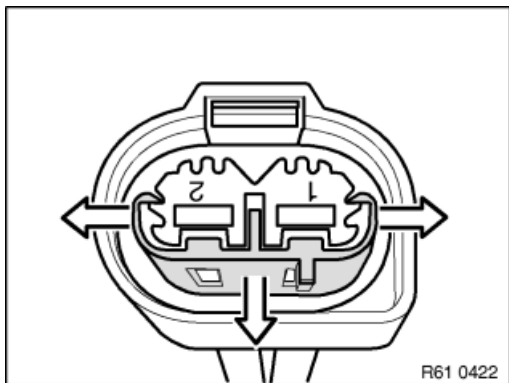
Press locking hook (2) downward and slide lock (1) out.



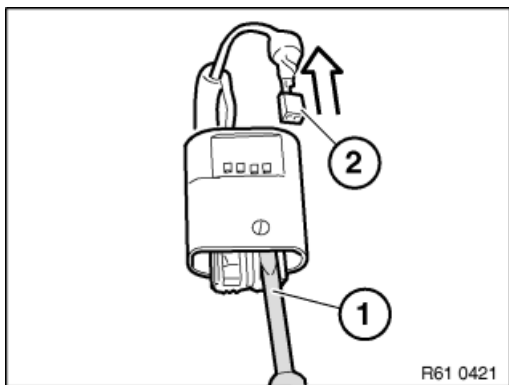
Press down retaining hook (1) with screwdriver and pull out cable with contact towards rear.



61 13 ... Inline plugs, 2-pin, System MPQ 2.8



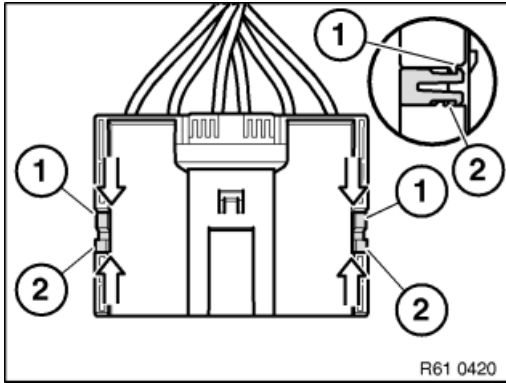
Press catch on outside in direction of arrow and remove towards top.



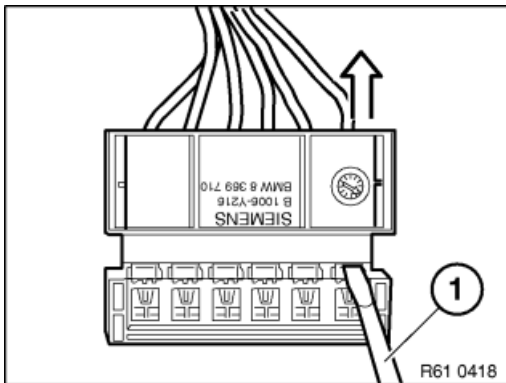
Press down retaining hook (1) with screwdriver and pull out cable and contact (2) towards rear.



61 13 ... Inline plugs, 3-, 6-pin, System Elo-Power 2.8



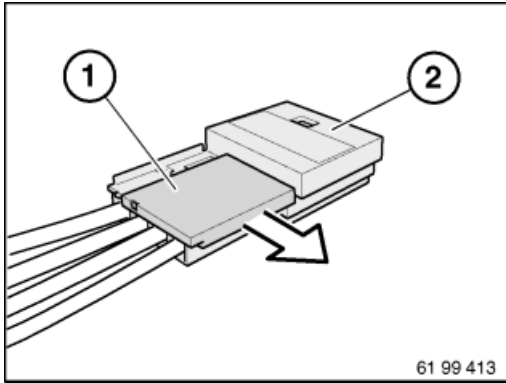
Press locking hook (1) in direction of arrow and disengage. Then unlock locking hook (2) and remove lock.



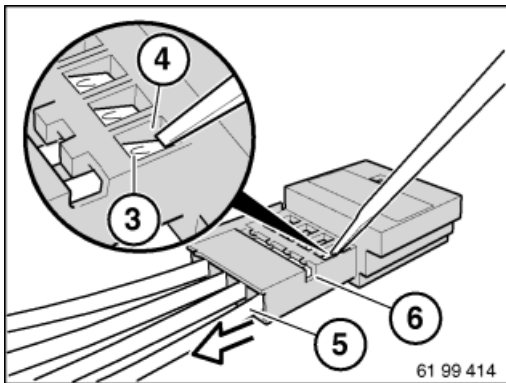
Press down retaining hook with screwdriver (1) and pull out cable with contact towards rear.



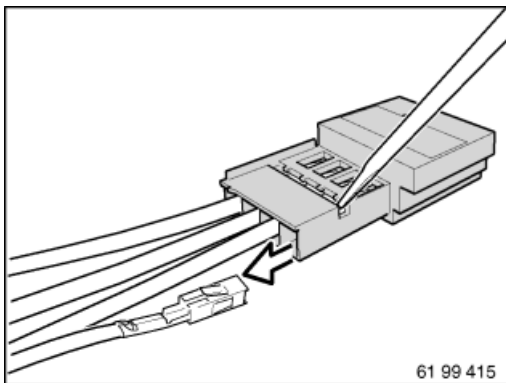
61 13 ... Inline plugs, 4-, 10-pin, System Elo



Detach fastener (1) from contact carrier (2).



Hold down retaining hook (3) of defective contact and pull cable and contact up to secondary lock (6).



Hold down retaining hook once again in secondary lock and pull cable and contact completely out of contact carrier.

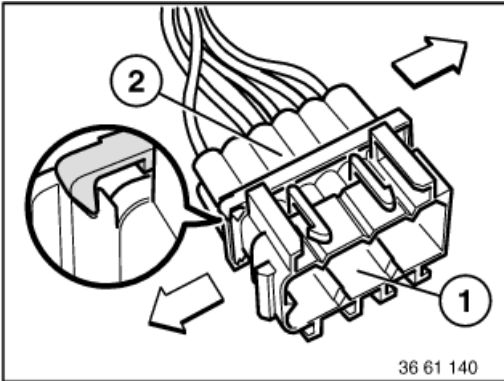


61 13 ... Inline plugs, 8-, 12-pin, System D2.5

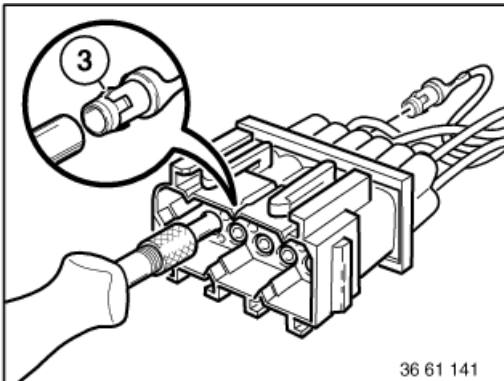


Special tools required:

- 61 0 303



Move upper section of connector (1) and lower section of connector (2) against each other in direction of arrow.



With special tool 61 0 303 , press down retaining hook (3) of corresponding contact and pull out cable with contact.

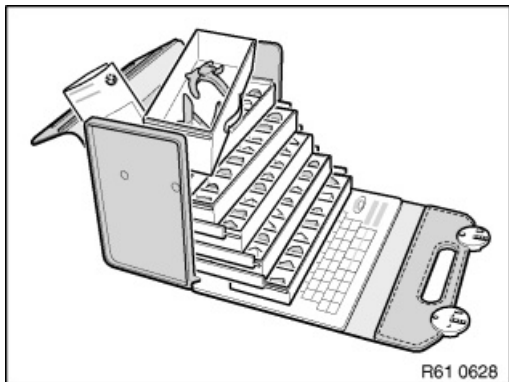


61 13 ... Installing comb connector for retrofitting/repairs



Special tools required:

- 61 9 040
- 61 9 041
- 61 9 042



Note:

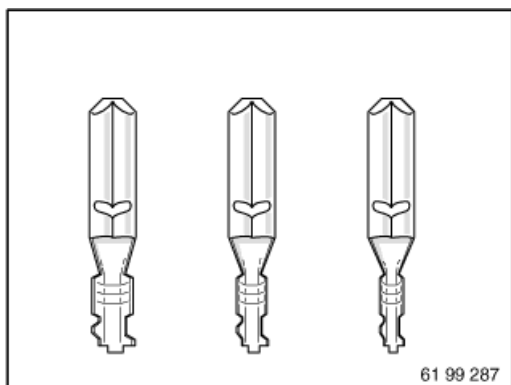
The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.

The case can no longer be ordered. Order individual parts for wiring harness repair through BMW Parts Department.

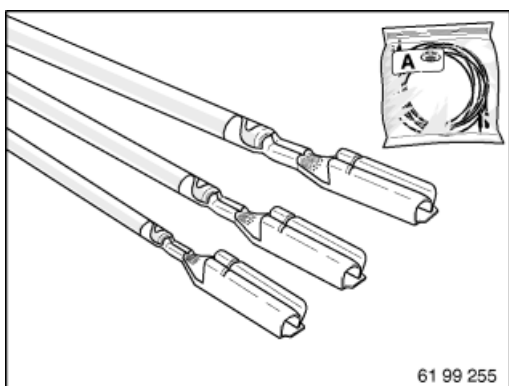
- Refer to Service Information:
SI 02 04 07 341

Special tools:

- Special tool 61 9 040



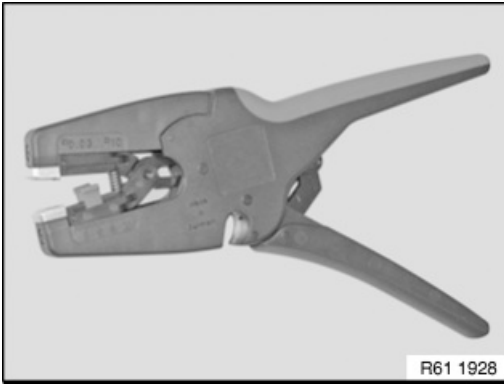
Choose contact sleeve (up to 4 mm²) in accordance with wire cross-section.



Alternatively:

Choose contact sleeves (up to 2.5 mm²) for comb connectors.



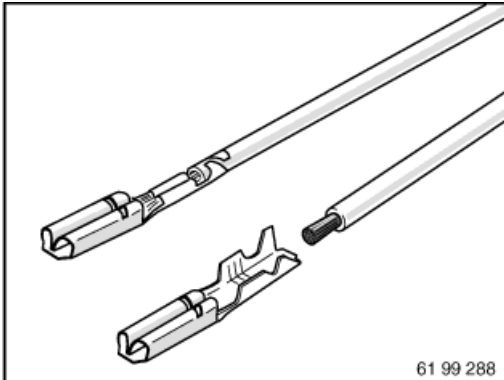


Cut through wire loop in wiring harness at established point.

Strip insulation from both wire ends.

See repair instructions

Cutting to length and stripping insulation from cables



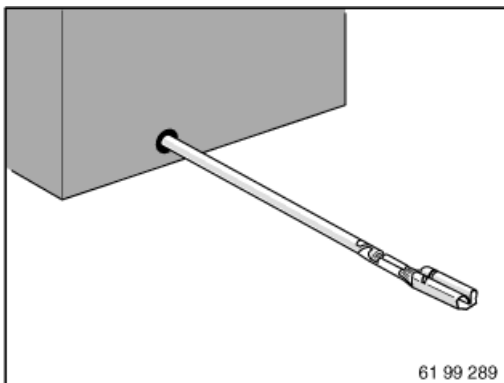
Crimp contact sleeves on both wire ends. *See repair instructions*

Crimping on stop parts

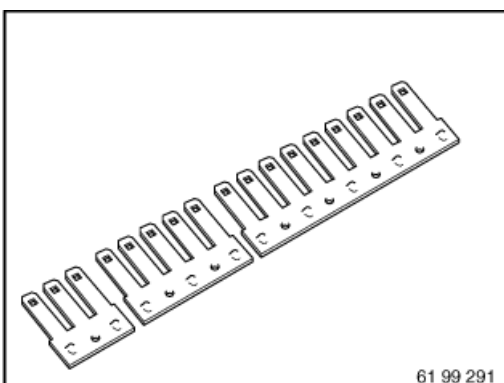
Note:

If using repair kit for contact sleeves, refer to repair instructions:

Butt connector for repairing a plug connection.

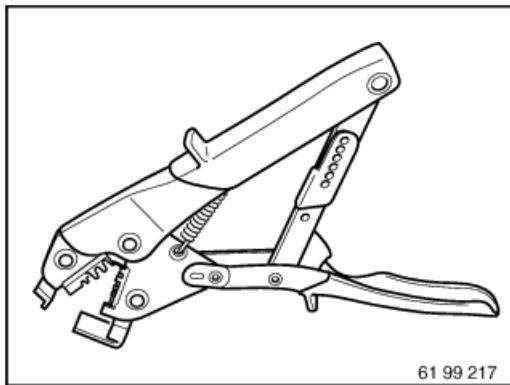


Crimp connecting cable for retrofitting likewise with contact sleeve.

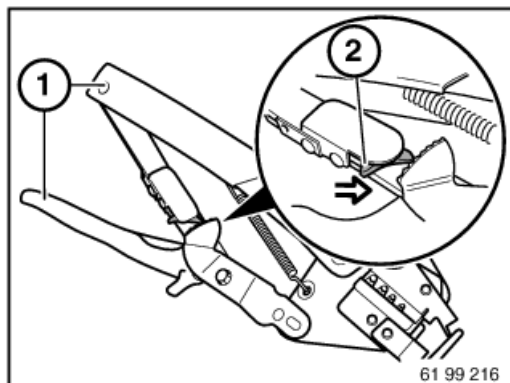


Cut required number of poles to length for comb connectors.

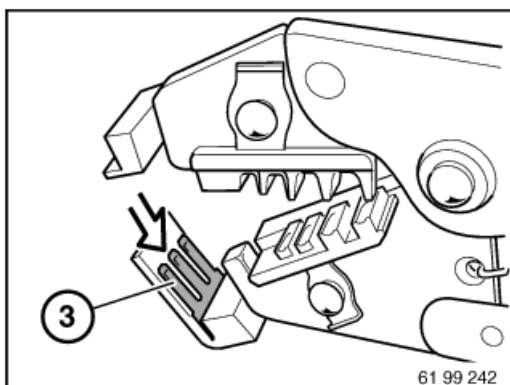




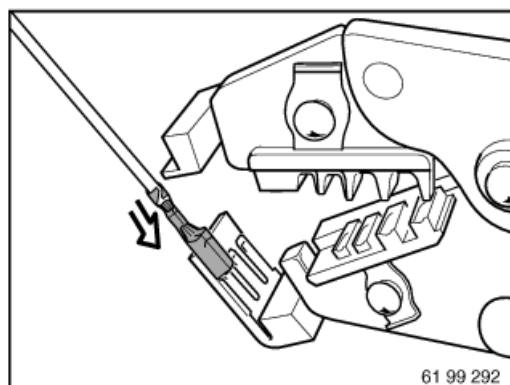
Special tool 61 9 041 (hand pliers) in conjunction with 61 9 042 (matrix) are used for pushing contact sleeves onto comb connectors. *See repair instructions*
Special tools for wiring harness repairs.



Unlock special tool 61 9 041 :
Squeeze grips (1) lightly and push release lever (2) in direction of arrow.
Or:
Compress handles until limit position, hand pliers unlock automatically.

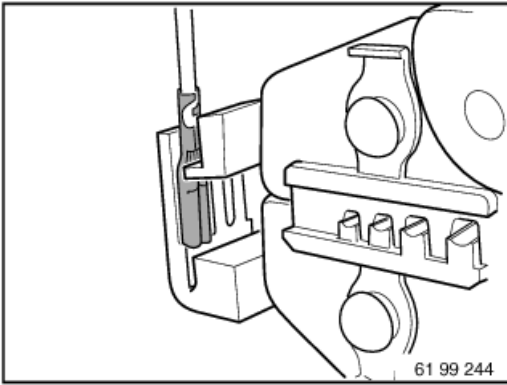


Insert prepared comb connectors (3) in special tool 61 9 041 / 61 9 042 .

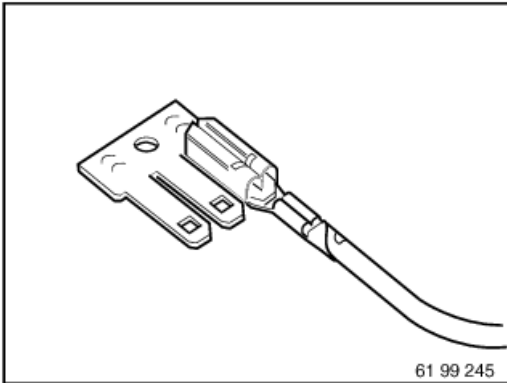


Attach wire with contact sleeve to comb connector.





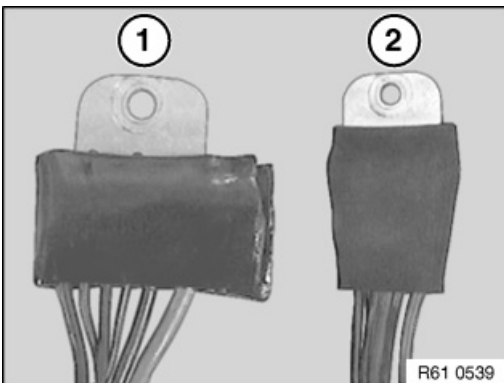
Press hand pliers together and slide on contact sleeve until limit position.



Important!

Once contact sleeves have been pushed on, they should not be detached again from the comb connector or reused.

Push on further contact sleeves for potential branching.



Installation in wet area (engine compartment, wheel arch):

Apply sealing compound on both sides and press into contacts (1).

Fit heat-shrink tubing and heat up with hot air blower (2) (approx. 250 °C).

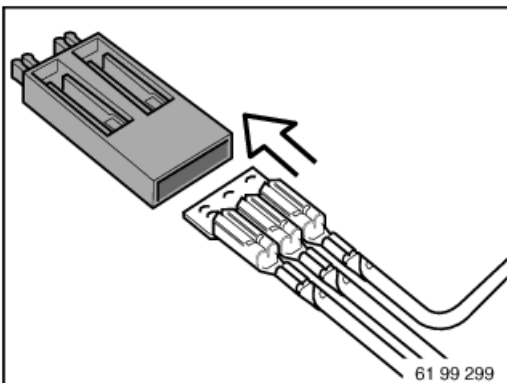
Note:

Ensure that comb connector has sufficient contact surface on attachment point.

Do not heat-shrink tubing on edges of comb connector too strongly, risk of cracking.

Allow heat-shrink tubing to cool down until hand-warm. Then press sealing material again into contacts and onto edges of comb connector.

If necessary, carefully heat-shrink tubing again.



Installation in dry area (interior, luggage compartment):

Slide assembled comb connector into insulation housing until it locks into place.

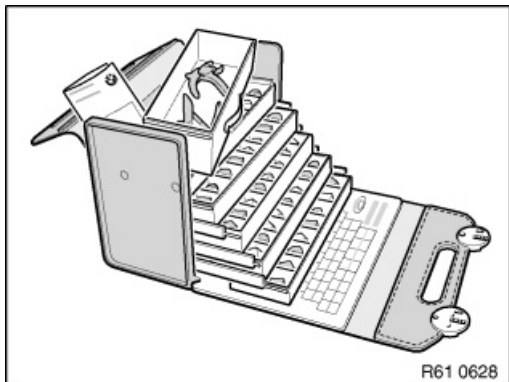


61 13 ... Installing comb connector for retrofitting/repairs



Special tools required:

- 61 9 041
- 61 9 042

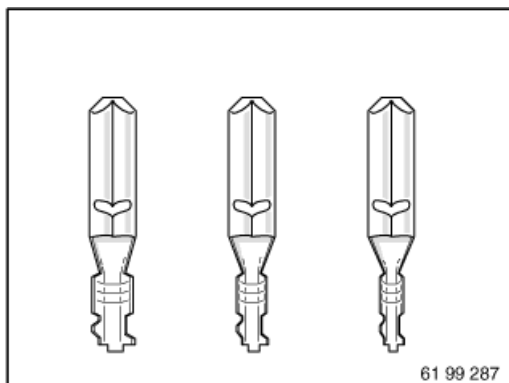


Note:

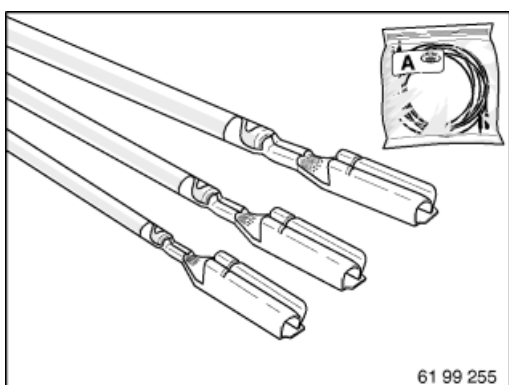
The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.

The case can no longer be ordered. Order individual parts for wiring harness repair through BMW Parts Department.

- Refer to Service Information:
SI 02 04 07 341



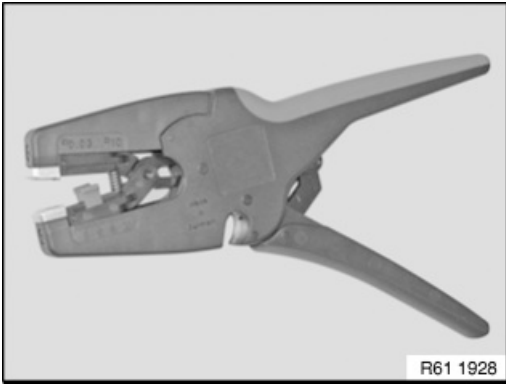
Choose contact sleeve (up to 4 mm²) in accordance with wire cross-section.



Alternatively:

Choose contact sleeves (up to 2.5 mm²) or comb connectors.



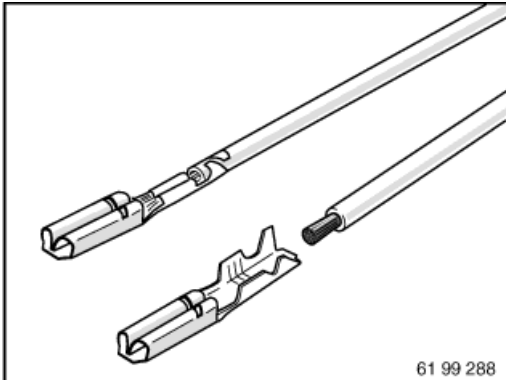


Cut through wire loop in wiring harness at established point.

Strip insulation from both wire ends.

See repair instructions

Cutting to length and stripping insulation from cables



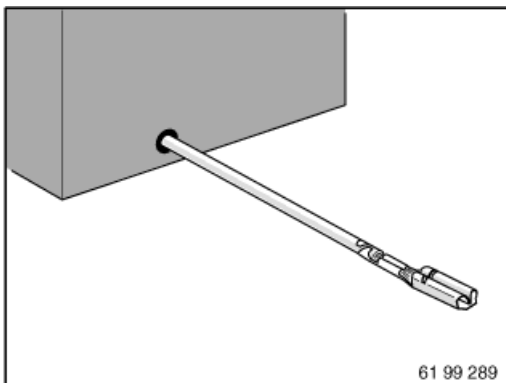
Crimp contact sleeves on both wire ends. *See repair instructions*

Crimping on stop parts

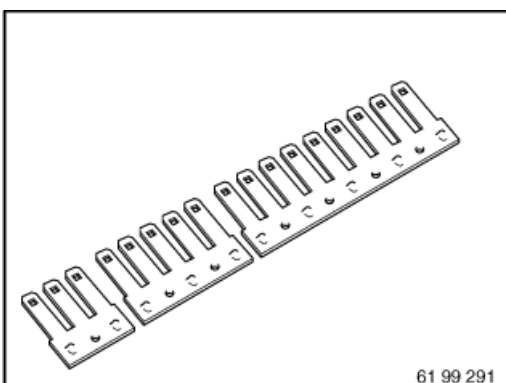
Note:

If using repair kit for contact sleeves, refer to repair instructions:

Butt connector for repairing a plug connection.

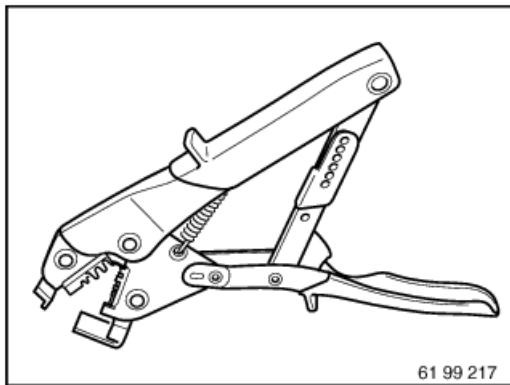


Crimp connecting cable for retrofitting likewise with contact sleeve.

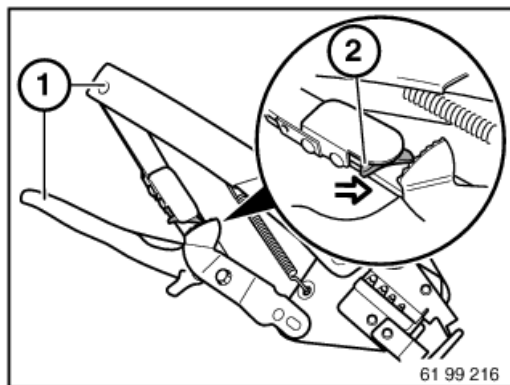


Cut required number of poles to length for comb connectors.

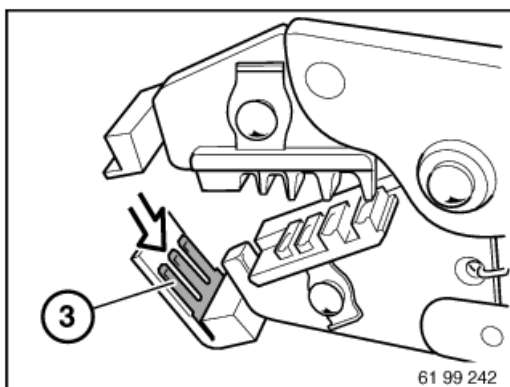




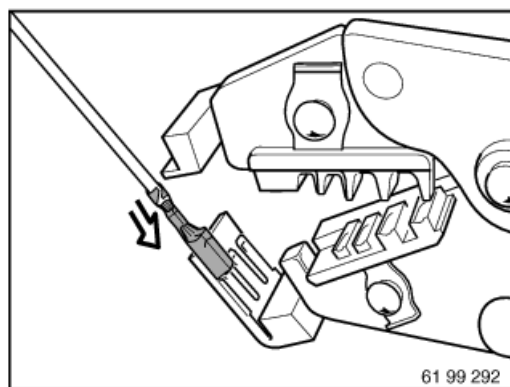
Special tool 61 9 041 (hand pliers) in conjunction with 61 9 042 (matrix) are used for pushing contact sleeves onto comb connectors. *See repair instructions*
Special tools for wiring harness repairs.



Unlock special tool 61 9 041 :
Squeeze grips (1) lightly and push release lever (2) in direction of arrow.
Or:
Compress handles until limit position, hand pliers unlock automatically.

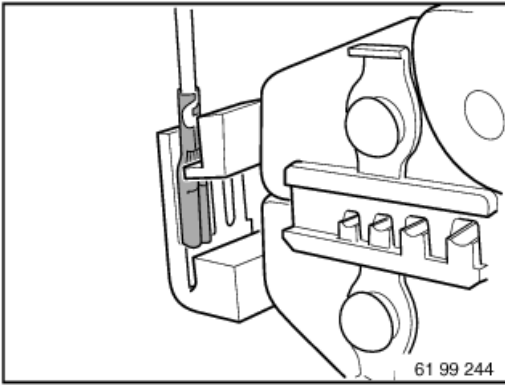


Insert prepared comb connectors (3) in special tool 61 9 041 / 61 9 042 .

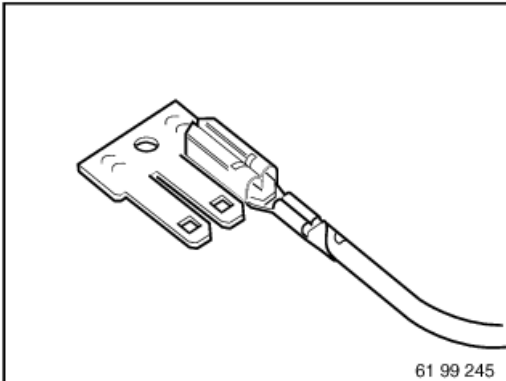


Attach wire with contact sleeve to comb connector.





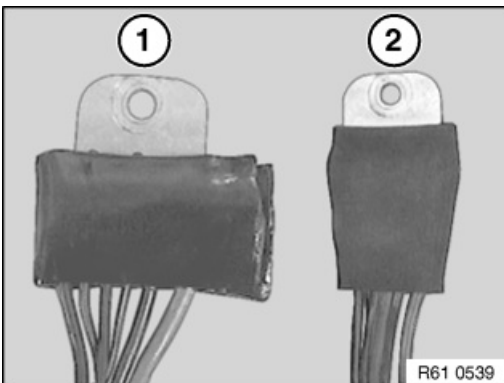
Press hand pliers together and slide on contact sleeve until limit position.



Attention!

Once contact sleeves have been pushed on, they should not be detached again from the comb connector or reused.

Push on further contact sleeves for potential branching.



Installation in wet area (engine compartment, wheel arch):

Apply sealing compound on both sides and press into contacts (1).

Fit heat-shrink tubing and heat up with hot air blower (2) (approx. 250 °C).

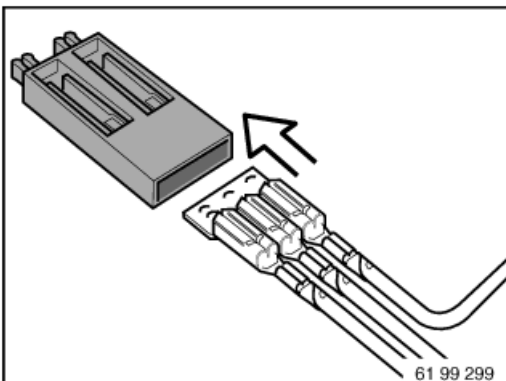
Note:

Ensure that comb connector has sufficient contact surface on attachment point.

Do not heat-shrink tubing on edges of comb connector too strongly, risk of cracking.

Allow heat-shrink tubing to cool down until hand-warm. Then press sealing material again into contacts and onto edges of comb connector.

If necessary, carefully heat-shrink tubing again.



Installation in dry area (interior, luggage compartment):

Slide assembled comb connector into insulation housing until it locks into place.



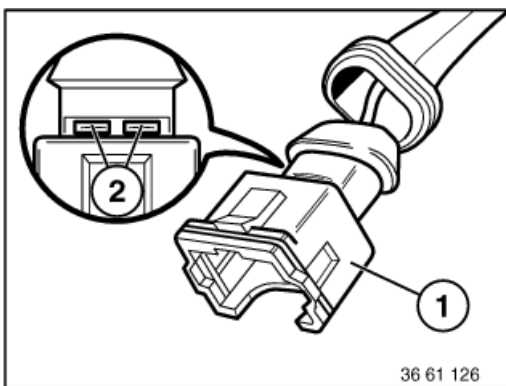


Special tools required:

- 61 0 300
- 61 0 400
- 61 1 100

Abbreviations of contacts and what they mean:

ELA	Strand seal
D 1.5 / 2.5 / 3.5	Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter
MDK	Miniature double flat spring contact
JPT	Junior Power timer
DFK	Double flat spring contacts
Elo	Electronic contacts
Elo Power	Electronic contacts for heavy load
MQS	Micro Quadlock system
MPQ	Micro Power Quadlock
MLK	Mini laminated contact
SLK	Sensor laminated contact
LSK	Load current contact
MLK	Mini laminated contact
Mcon	Multi contact



Important!

The contacts can be changed on ultrasonically welded connectors (1).

Ultrasonically welded connectors (1) must be replaced completely.

Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.



Note:

Special tools referred to in the repair instructions below are contained in the following special tool sets:

- Unlocking and pressing-off tool 61 1 150
is replaced as of 09/2005 by 61 0 300 (BMW) and 61 0 400 (MINI)
- Release and pressing-off tool 61 1 100 (engine)



Repair instructions for opening connector housings and removing contacts of different connector systems:

Connector system D 1.5/D 2.5:

- Circular connectors, 7- or 8-pin, system D 2.5
- Circular connectors, 13-pin, system D 2.5
- Circular connectors, 20-pin, system D 2.5
- Circular connectors, 4-, 7-, 10-, 12- or 25-pin, system D 1.5/D 2.5
- In-line connectors, 15-pin, system D 2.5
- In-line connectors, 8-, 12-pin, system D 2.5
- In-line connectors, 30-pin, system D 2.5
- In-line connectors, 20-pin, system D 2.5

Connector system JPT/MDK/DFK:

- In-line connectors, 2-pin, System JPT ELA
- In-line plugs, 2-pin, System MDK 3 plus 2.8
- In-line plugs, 4-pin, System DFK ELA

Connector system Elo/Elo Power:

- Inline plugs, 4-, 10-pin, System Elo
- In-line connectors, 6- to 50-pin, System Elo
- Inline plugs, 3-, 6-pin, System Elo-Power 2.8

Connector system LSK:

- Connector housing LSK contact

Connector system MQS/MPQ:

- Inline connectors, 6-, 8-pin, System MQS
- Inline plugs, 2-pin, System MPQ 2.8
- Control unit connectors, 25-, 35-, 55-, 83-, 88-pin
- In-line plugs, 24-pin, Hybrid System MQS/MPQ
- Socket housing 42-, 43-pin, Hybrid System MQS / MPQ
- Socket housings 2x21-, 2x27-pin, Hybrid System MQS/MPQ, Elo/Elo Power
- In-line connectors, 30-pin, Hybrid System MQS/MPQ
- Socket housings, 5-, 8-pin, System MQS/MPQ
- Socket housing (radio connector), Hybrid System MQS/MPQ

For connector contact systems not listed, refer to Service Information:

SI 2 05 05 217

SI 2 05 06 294

SI 2 03 08 440

SI 2 08 06 312

SI 2 02 08 439

SI 2 01 08 438





**Important!**

To avoid damage when handling optical fibres, comply with the following points:

- The minimum permitted bending radius is 25 mm
- Do not subject optical fibres to compressive and tensile load
- Protect optical fibres against the effects of heat $\geq 85^{\circ}\text{C}$ (e.g. during welding work, drying work with infrared beams or hot air blower)
- Fibre-optic cables are permitted to show only one junction point (bridge), replace fibre-optic cables if necessary

*Note:*

The optical fibres are coloured differently as follows:

- Green = **MOST** (**M**edia **O**riented **S**ystems **T**ransport) optical fibre
- Yellow = **ISIS** (**I**ntelligent **S**afety and **I**ntegration **S**ystem) optical fibre
- Orange=repair fibre-optic cables

Follow notes for processing cables and optical fibres.





The following applies in general:

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies:

Shielded lines

Interference radiation and interference resistance can lead to neutral zones at contact points in the shielding. Consequently, distinctions have to be drawn between the following types:

Coaxial lines

- Shielded coaxial cables RTK031 may only be repaired with special crimping tool.
- For aerial lines only the bushing contact may be repaired.
- RG174 Lines and the bushing contact may not be repaired.

CVBS lines

- CVBS cables may not be repaired.
- CVBS cables must be replaced in their entirety.

HSD lines

- HSD cables may not be repaired.
- HSD cables must be replaced in their entirety.

Optical fibre cable:

Note:

Fibre-optic cables are coloured differently as follows:

- Green = **MOST** (Media Oriented Systems Transport) optical fibres
- Yellow = **ISIS** (Intelligent Safety and Integration System) optical fibres
- Orange=repair fibre-optic cables

Attention!

- Fibre-optic cables are permitted to show only one junction point (bridge), replace fibre-optic cables if necessary
- Smallest permissible bending radius is 25 mm
- Avoid effects of heat $\geq 85^\circ$

Treating cables and optical fibres

FlexRay (twisted cables)

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

Note:

- FlexRay lines may only reveal one separation point (bridge) per line



- Flexray lines may only reveal one separation point (bridge); renew complete line if necessary.
- If possible, maintain twisted cable after repair.
- After repairs, twist cables as close as possible to the connector/separation point.
- Twisting must be as symmetrical as possible.

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables

Replacing wiring harnesses

Repair wiring harnesses mainly cover the full equipment of the vehicle. If certain optional equipment is not installed in the vehicle, note the following:

- If necessary, secure the remaining connectors.
- If necessary, seal the remaining connectors outside the vehicle interior, for example, with butyl tape in such a way that moisture ingress can be eliminated permanently.

Note:

Repair wiring harnesses can be equipped with an **additional socket housing** (e.g. 30-pin), **which was not provided on the previous vehicle-side wiring harness**. This socket housing also cannot be found in the wiring diagram.

Procedure

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **in the vehicle interior** (in the footwell, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.
- Alternatively, a suitable pin housing can be fitted on the vehicle-side wiring harness and connected to the additional socket housing.

However, this is permitted only if the following conditions are met:

- Carpets must not protrude visibly or become deformed due to the installation of the additional plug connection.
- It must be possible to install the adjacent components (for example, trims, trim panels, etc.) correctly after installing the additional plug connection.
- All the attachment points of the adjacent components (for example, trims, trim panels, etc.) must engage correctly.
- There must be no rattling noise due to the installation of the additional plug connection.
- The additional plug connection must not damage the adjacent components/wiring harnesses, etc..

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **outside the vehicle interior** (in the wheel arch, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.



- **Using the additional socket housing is not permitted with a separation point outside the vehicle interior.**



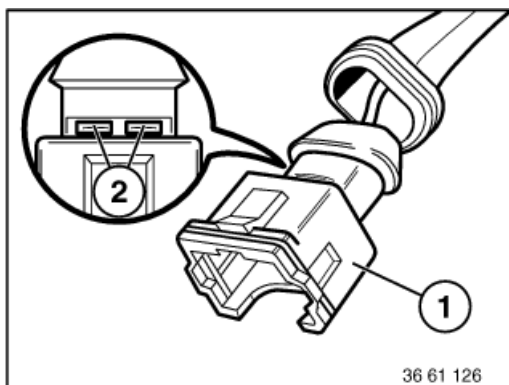


Special tools required:

- 61 0 300
- 61 0 400
- 61 1 100
- 61 1 150

Abbreviations of contacts and what they mean:

ELA	Strand seal
D 1.5 / 2.5 / 3.5	Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter
MDK	Miniature double flat spring contact
JPT	Junior Power timer
DFK	Double flat spring contacts
Elo	Electronic contacts
Elo Power	Electronic contacts for heavy load
MQS	Micro Quadlock system
MPQ	Micro Power Quadlock
MLK	Mini laminated contact
SLK	Sensor laminated contact
MLK	Mini laminated contact
Mcon	Multi contact



Important!

The contacts can be changed on ultrasonically welded plugs (1).
Ultrasonically welded plugs (1) must be replaced completely.
Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.



Note:

Special tools referred to in the repair instructions below are contained in the following special tool kits:

- Release and press-out tool 61 1 150
is replaced from 09/2005 by 61 0 300 (BMW) and 61 0 400 (MINI)
- Release and press-out tool 61 1 100 (engine)



Repair instructions for opening plug housings and removing contacts of different plug systems:

Plug system D 1.5/D 2.5:

- Circular plugs, 7-, 8-pin, System D 2.5
- Circular plugs, 13-pin, System D 2.5
- Circular plugs, 20-pin, System D 2.5
- Circular plugs, 4-, 7-, 10-, 12-, 25-pin, System D 1.5/D 2.5
- In-line plugs, 15-pin, System D 2.5
- In-line plugs, 8-, 12-pin, System D 2.5
- In-line plugs, 30-pin, System D 2.5
- In-line plugs, 20-pin, System D 2.5

Plug system JPT/MDK/DFK:

- In-line plugs, 2-pin, System JPT ELA
- In-line plugs, 2-pin, System MDK 3plus 2.8
- In-line plugs, 4-pin, System DFK ELA

Plug system Elo/Elo-Power:

- In-line plugs, 4-, 10-pin, System Elo
- In-line plugs, 6- to 50-pin, System Elo
- In-line plugs, 3-, 6-pin, System Elo-Power 2.8

Plug system MQS/MPQ:

- In-line plugs, 6-, 8-pin, System MQS
- In-line plugs, 2-pin, System MPQ 2.8
- Control unit plugs, 25-, 35-, 55-, 83-, 88-pin
- In-line plugs, 24-pin, Hybrid System MQS/MPQ
- Socket housing 42-, 43-pin, Hybrid System MQS / MPQ
- Socket housings 2x21-, 2x27-pin, Hybrid System MQS/MPQ, Elo/Elo-Power
- In-line plugs, 30-pin, Hybrid System MQS/MPQ
- Socket housings, 5-, 8-pin, System MQS/MPQ
- Socket housing (radio plug), Hybrid System MQS/MPQ

For plug contact systems not listed, refer to Service Information:

SI 2 05 05 217

SI 2 05 06 294

SI 2 03 08 440

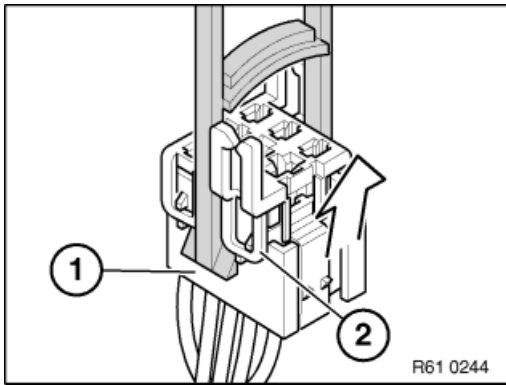
SI 2 08 06 312

SI 2 02 08 439

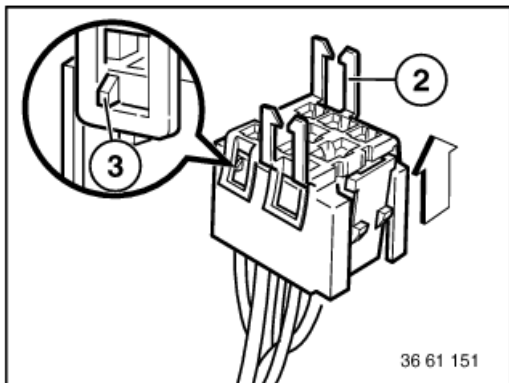
SI 2 01 08 438



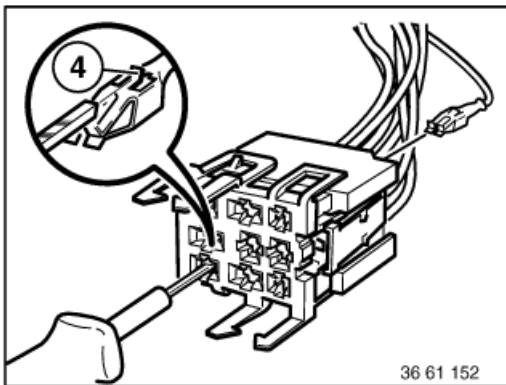
61 13 ... Relay carrier



Place special tool 61 1 153 against relay carrier (1) and carefully pull in direction of arrow until the locking tabs (2) of the relay carrier are raised up.



Pull relay carrier (2) in direction of arrow into the first catch (3).



Press down arrester hook (4) of corresponding contact and pull out the cable with contact.

With special tool 61 1 136 or 61 1 137 (press out) press out dual spring contacts.

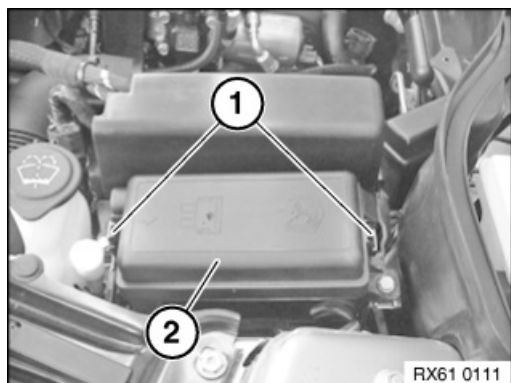


61 13 055 Removing and installing (replacing) fuse box for engine compartment

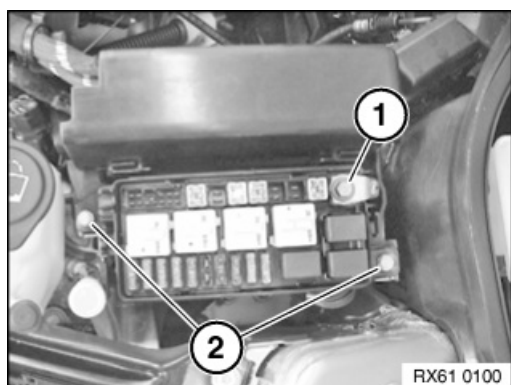


Necessary preliminary tasks:

- Disconnect battery earth lead

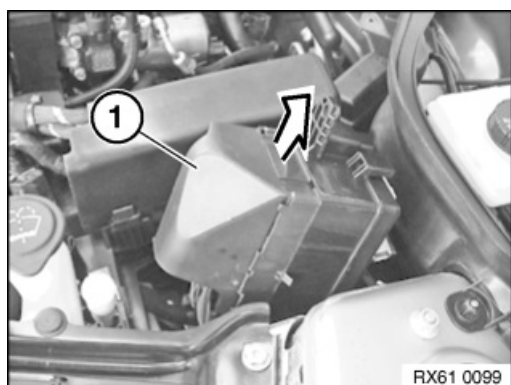


Unlock latch mechanisms (1) and remove fuse box cover (2).



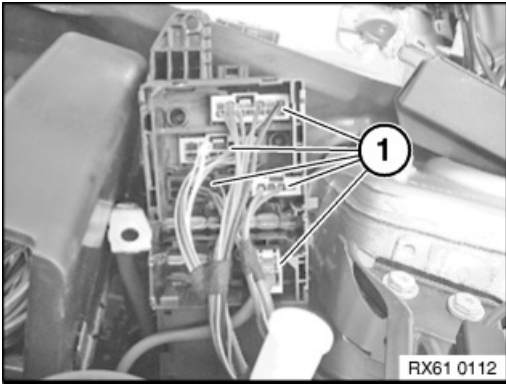
Release screw (1) and remove terminal shoe. Tightening torque 61 13 4AZ.

Unfasten screws (2). Tightening torque 61 13 1AZ.
Raise the fuse box.



Remove protective cap (1).





Disconnect all plug connections (1) from the bottom of the fuse box.

Replacement:

- Modify the fuses and relay



61 31 134 Removing and installing/replacing USB audio interface connecting socket



Operation is described in:

Removing and installing/replacing AV connecting socket



61 00 ... **Repairing airbag cables**

Important!

Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations for handling components of airbag system.

Instructions for disconnecting and connecting battery.

In event of non-visible damage to wiring harness:

Disconnect plug connection on airbag module or on adapter plug. It is absolutely vital to disconnect the contacts in succession as there is a risk of mixing up (similar parts)! Cut through one cable after the other at an appropriate position, do not under any circumstances cut through both cables at the same time. Insulate cables remaining in wiring harness with insulating tape. Now disconnect plug connection on airbag control unit. Unpin contacts. Cut through one cable after the other at an appropriate position and insulate with insulating tape, do not under any circumstances cut through both cables at the same time. Pin contacts of repair cable for airbag control unit in control unit plug, assignment of repair cables is relevant. Lay repair cable in vehicle parallel to existing airbag lead. Now pin in contacts for airbag control unit or contacts of adapter plug, assignment of repair cables is relevant. Cut off excess length of repair cable in proximity (visible area) of airbag module or of adapter plug. Twist open cables. With the butt connectors and heat-shrink tubings in the Electronic Parts Catalogue (EPC), reconnect the cables with the same cable colours. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (heat-shrink tubing) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

Cutting off and insulating cables.

Repairing a plug connection using butt connectors.

Installing and removing contacts.

In event of visible damage:

Expose cable at damaged areas. Cut through one cable after the other at an appropriate position and insulate cables no longer required in wiring harness with insulating tape, do not under any circumstances cut through both cables at the same time. Now, depending on the scope of work, unpin contacts either on airbag control unit/airbag module or on adapter plug. Cut off unpinned cables. Insulate cables remaining in wiring harness with insulating tape. Now pin in contacts of repair cable, assignment of repair cables is relevant. Lay repair cable in vehicle parallel to existing airbag lead up to separation point. Cut off excess length of repair cable. Twist open cables. Connect cables with butt connectors and heat-shrink tubings in Electronic Parts Catalogue (EPC), assignment of repair cables is relevant. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (heat-shrink tubing) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

Cutting off and insulating cables.

Repairing a plug connection using connectors.

Installing and removing contacts.



61 00 ... Repairing airbag cables

Important!

Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations for handling components of airbag system.

Instructions for disconnecting and connecting battery.

In event of non-visible damage to wiring harness:

Disconnect plug connection on airbag module or on adapter plug. It is absolutely vital to disconnect the contacts in succession as there is a risk of mixing up (similar parts)! Cut through one cable after the other at an appropriate position, do not under any circumstances cut through both cables at the same time. Insulate cables remaining in wiring harness with insulating tape. Now disconnect plug connection on airbag control unit. Unpin contacts. Cut through one cable after the other at an appropriate position and insulate with insulating tape, do not under any circumstances cut through both cables at the same time. Pin contacts of repair cable for airbag control unit in control unit plug, assignment of repair cables is relevant. Lay repair cable in vehicle parallel to existing airbag lead. Now pin in contacts for airbag control unit or contacts of adapter plug, assignment of repair cables is relevant. Cut off excess length of repair cable in proximity (visible area) of airbag module or of adapter plug. Twist open cables. With the butt connectors and heat-shrink tubings in the Electronic Parts Catalogue (EPC), reconnect the cables with the same cable colours. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (heat-shrink tubing) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

Cutting off and insulating cables.

Repairing a plug connection using butt connectors.

Installing and removing contacts.

In event of visible damage:

Expose cable at damaged areas. Cut through one cable after the other at an appropriate position and insulate cables no longer required in wiring harness with insulating tape, do not under any circumstances cut through both cables at the same time. Now, depending on the scope of work, unpin contacts either on airbag control unit/airbag module or on adapter plug. Cut off unpinned cables. Insulate cables remaining in wiring harness with insulating tape. Now pin in contacts of repair cable, assignment of repair cables is relevant. Lay repair cable in vehicle parallel to existing airbag lead up to separation point. Cut off excess length of repair cable. Twist open cables. Connect cables with butt connectors and heat-shrink tubings in Electronic Parts Catalogue (EPC), assignment of repair cables is relevant. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (heat-shrink tubing) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

Cutting off and insulating cables.

Repairing a plug connection using connectors.

Installing and removing contacts.

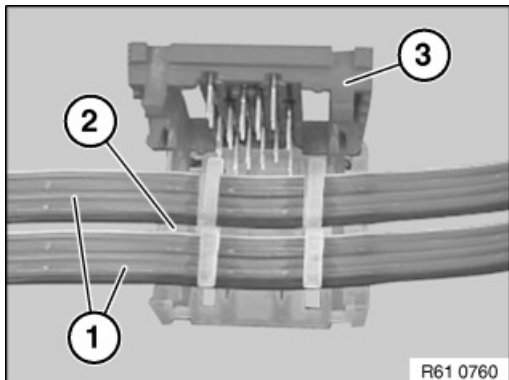


61 13 ... Repairing ribbon cables

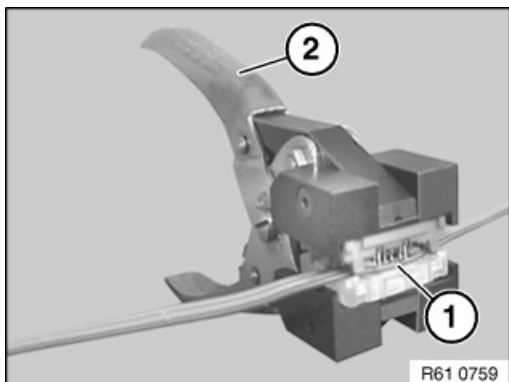


Special tools required:

- 61 1 190



Place ribbon cables (1) in connector housing (2) and close cover (3).



Place connector housing (1) in pliers (2) 61 1 190 .
Close pliers (2).



61 13 ... Socket housing (radio connector), Hybrid System MQS/MPQ



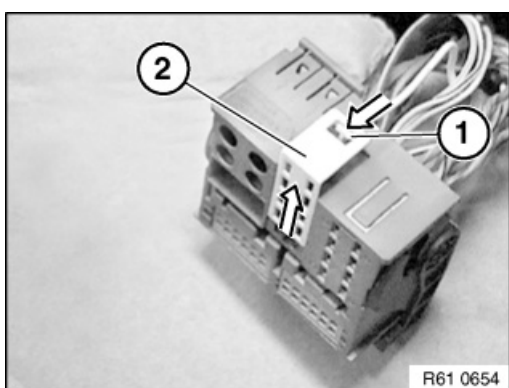
Special tools required:

- 61 0 314



Manufactured by AMP: The following contact types without strand sealing can be fitted in the connector housings:

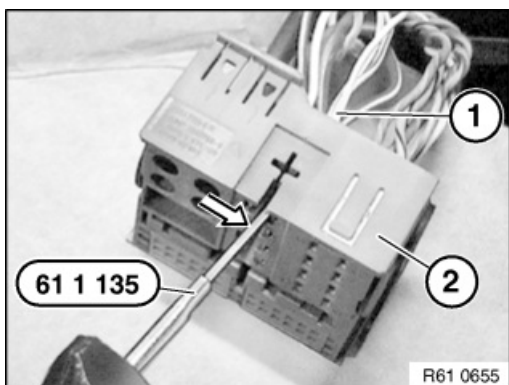
- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)



Removing MPQ contacts from radio connector:

Press lock (1) in direction of arrow.

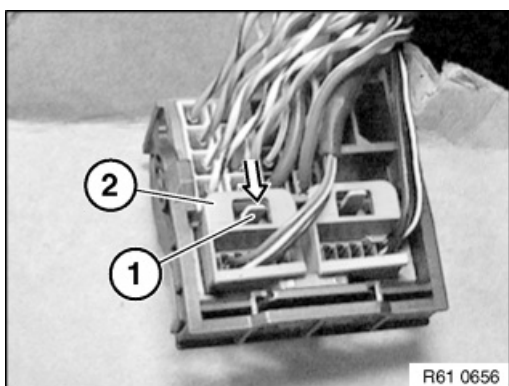
Detach secondary lock (2) from radio plug.



Feed special tool 61 0 314 (61 1 135) past side of contact.

Press special tool 61 0 314 (61 1 135) in direction of arrow.

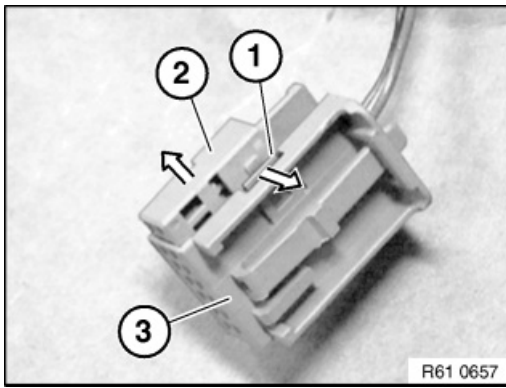
Pull wire (1) with socket contact out of radio connector (2).



Removing MQS contacts from contact carrier:

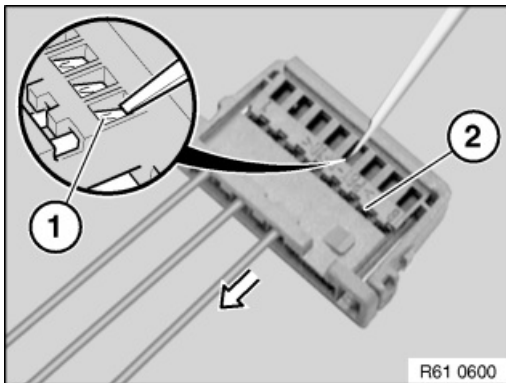
Press lock (1) in direction of arrow and pull housing (2) out of radio connector.





Press lock (1) in direction of arrow. Pull contact carrier (2) out of housing (3). *Note:*

When the contact carrier is pulled out, the secondary locks of the socket contacts are raised.

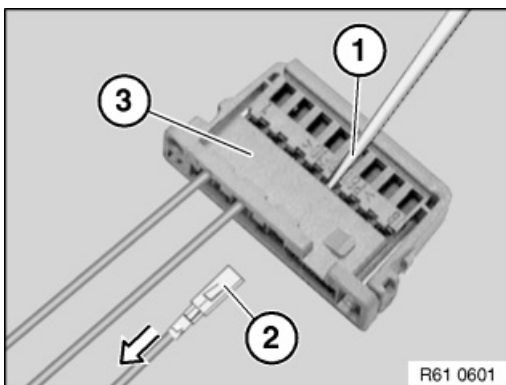


Note:

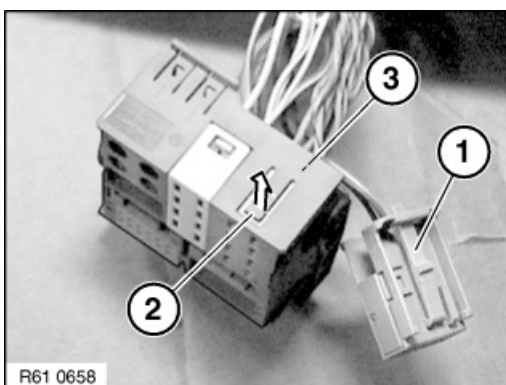
Schematic diagram shows the 8-pin socket housing by way of example.

Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

Pull wire with socket contact in direction of arrow as far as secondary lock (2).



Hold down retaining hook in secondary lock (1) again. Pull wire with socket contact (2) out of contact carrier (3).



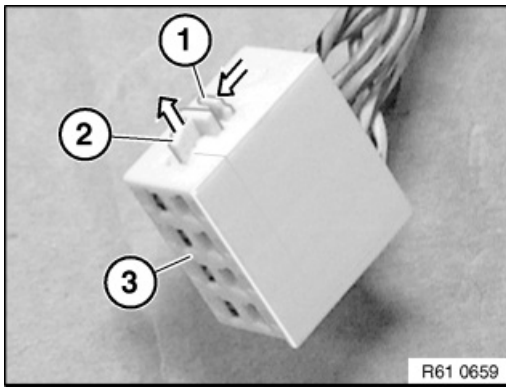
Removing MPQ contacts from contact carrier:

Remove contact carrier (1) with MQS contacts from radio connector.

Raise lock (2) on radio connector.

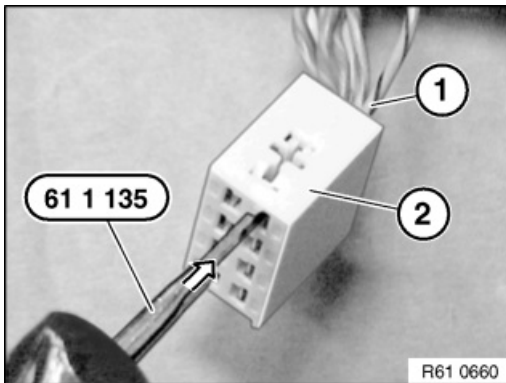
Pull contact carrier (3) out of radio connector.





Press lock (1) in direction of arrow.

Pull secondary lock (2) in direction of arrow completely out of contact carrier (3).



Press special tool 61 0 314 (61 1 135) on inside of contact into contact carrier (2).

Pull wire with socket contact (1) out of contact carrier (2).



61 13 ... Socket housing 42-, 43-, 46-pin, Hybrid System MQS / MPQ



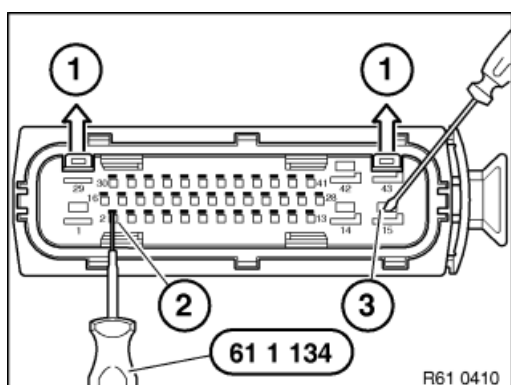
Special tools required:

- 61 0 312



Manufactured by AMP: The following contact types without strand sealing can be fitted in the socket housings:

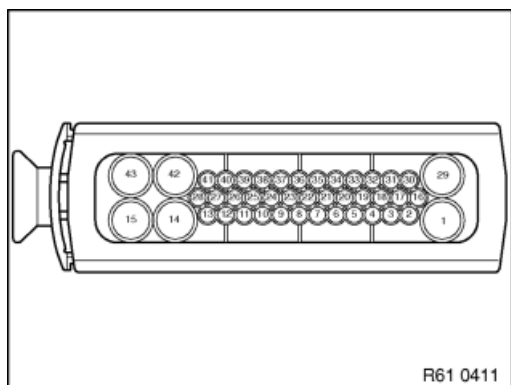
- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)



Open secondary locks (1) on socket housing.

Press back retaining hook of MQS contacts (2) with special tool 61 0 312 61 1 134 and pull out cable with contact.

Press back retaining hook of MPQ contacts (3) with screwdriver and pull out cable with contact.



Installation note:

Bend open retaining hook of contacts gently before inserting into connector housing.

For installation of contacts, observe chamber numbers on reverse side of socket housing.



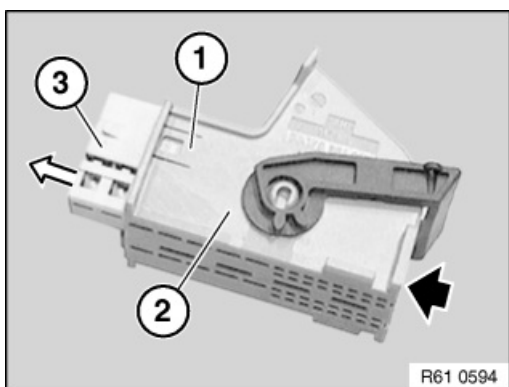


Manufactured by AMP: The following contact types without strand sealing can be fitted in the socket housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)

Manufactured by Siemens: The following contact types without strand sealing can be fitted in the socket housings:

- Elo (electrical contact)
- Elo Power 2.8 mm width (electrical contact for heavy loads)
- Elo Power 5.2 mm width (electrical contact for heavy loads)



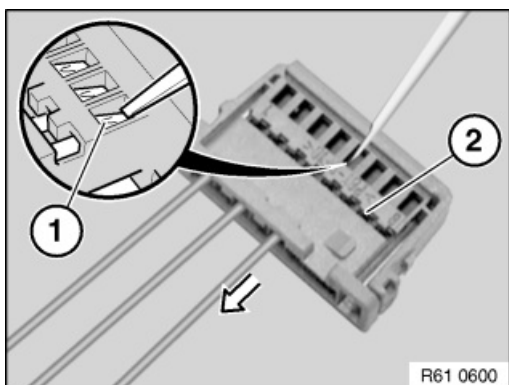
Raise lock (1) on housing (2).

Push contact carrier (3) from rear out of housing.

Note:

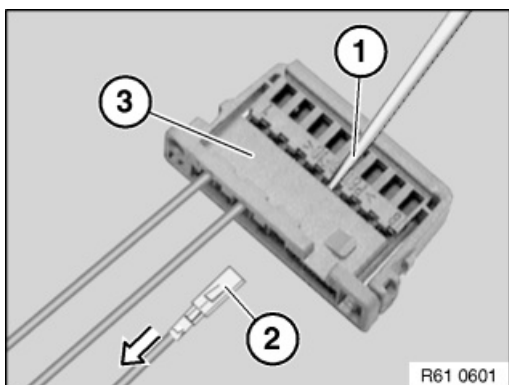
The second contact carrier is pushed out in the same way.

Pushing out the contact carrier releases the secondary locks of the socket contacts.



Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

Pull wire with socket contact in direction of arrow as far as secondary lock (2).



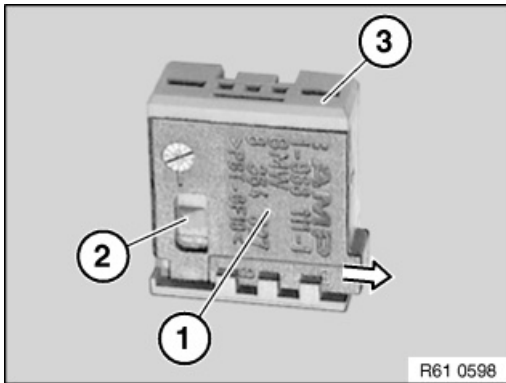
Hold down retaining hook in secondary lock (1) again and pull cable with socket contact (2) completely out of contact carrier (3).





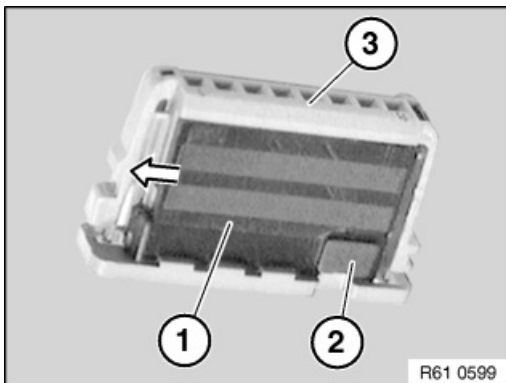
Manufactured by AMP: The following contact types without strand sealing can be fitted in the connector housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)



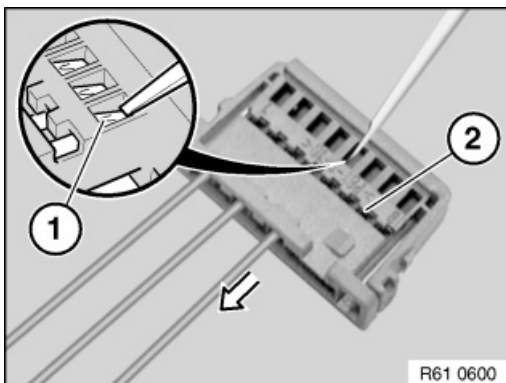
Socket housing, 5-pin (Hybrid System MQS/MPQ)

Raise fastener (1) over retaining lug (2) and pull off from contact carrier (3).



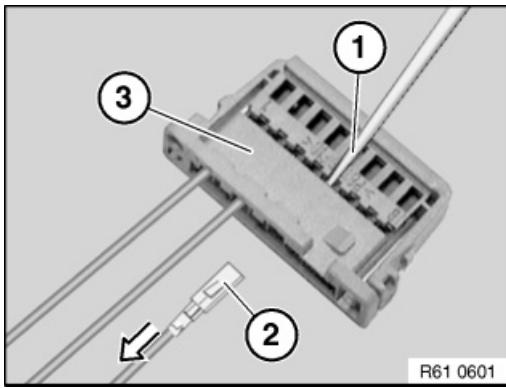
Socket housing, 8-pin (MQS):

Raise fastener (1) over retaining lug (2) and pull off from contact carrier (3).



Hold down retaining hook (1) of contact and pull cable with contact as far as secondary lock (2).





Hold down retaining hook in secondary lock (1) again and pull cable with contact (2) completely out of contact carrier (3).

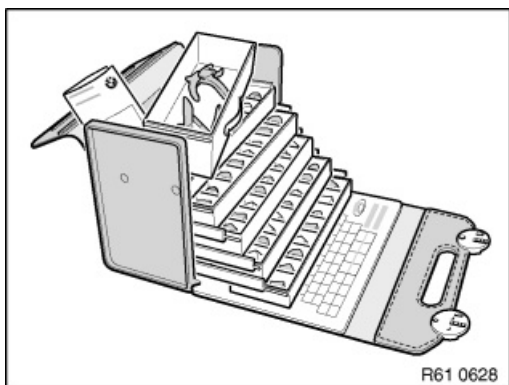


61 13 ... Special tools for wiring harness repairs



Special tools required:

- 61 0 300
- 61 0 400
- 61 1 100
- 61 4 320
- 61 0 200
- 61 0 210
- 61 0 220
- 61 0 230
- 61 0 240



Repair range, vehicle electrical system:

Single parts for wiring harness repairs*

* Sourcing reference: BMW Parts Department

Note:

- Refer to Service Information:
SI 2 04 07 341



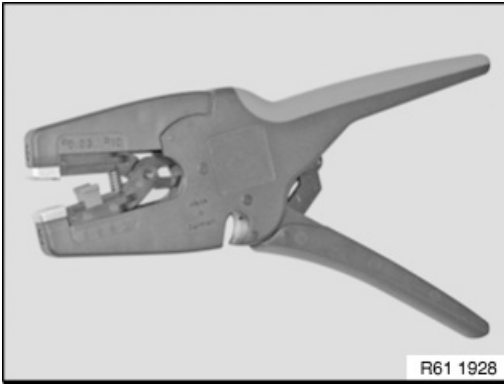
Release and press-out tool:

- Special tool 61 0 300
- Special tool 61 0 400 (MINI N12/N14)
- Special tool 61 1 100 (engine)

Handling:

- Notes for opening contacts and locks of different connector contact systems





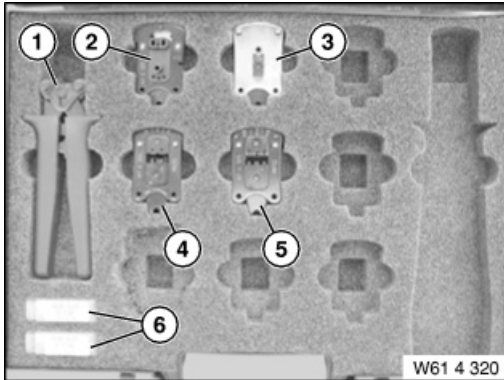
Cutting to length and stripping insulation from cables:

Wire stripper MultiStrip10*

*Sourcing reference BMW Workshop Equipment Catalogue

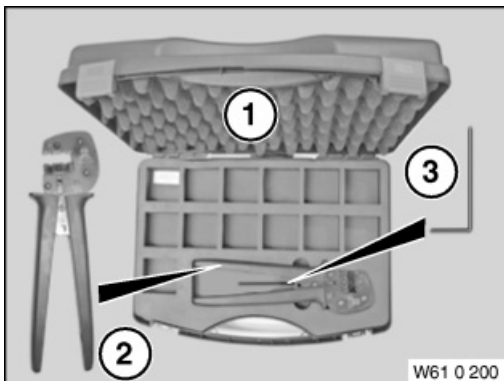
Handling:

- Cutting cables to length and strip insulation



Crimping stop parts (small contacts) and butt connectors:

- Special tool 61 4 320
 1. Tool without crimping head
 2. Crimping head (stripping insulation and cutting fibre-optic cables to length)
 3. Crimping head (crimping fibre-optic cable contacts)
 4. Crimping head (crimping MQS contacts)
 5. Crimping head (crimping MPQ contacts)
 6. Replacement blade (face-cutting fibre-optic cables)
 7. Replacement blade with tool (insulation stripping unit)
 8. Universal crimping head (SI 2 04 06 293)



Crimping stop parts (large contacts) and butt connectors:

- Special tool 61 0 200 (crimping set)
- Special tool 61 0 210 (matrix set SLK 8)
- Special tool 61 0 220 (matrix set SLK 2.8)
- Special tool 61 0 230 (matrix set MAK 8 / DFK4)
- Special tool 61 0 240 (butt connector 4.0 - 6.0 mm²)

Handling:

- Refer to Service Information:
SI 2 02 05 194
SI 2 07 05 233



61 13 ... Treating cables and optical fibres



Special tools required:

- 61 4 320
- 61 0 200



Note:

Special tools referred to in the repair instructions below are contained in the following special tool sets:

Repair range for vehicle electrical system	SI 2 04 07 341
Crimping set with pliers for optical fibres, Micro Power Quadlock (MPQ), Micro Quadlock System (MQS) contacts and universal crimping head	61 4 320 61 0 200

Subject of repair instructions

- Special tools for wiring harness repairs
 - Cutting cables to length and strip insulation
 - Crimping stop parts (contacts)
 - Butt connector for repairing a plug connection
 - Comb connector for retrofitting/repairs
 - Cutting to length and stripping insulation from optical fibres
- Crimping optical fibres



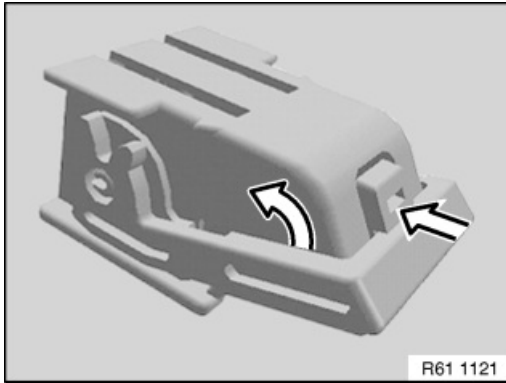
61 13 ... Unlocking and disconnecting different plug connections



Note:

The document describes unlocking and disconnecting different types of plug connections.

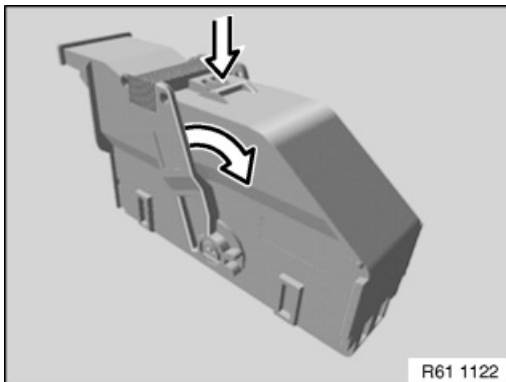
Differences in the details of the size and shape of the plug connections are possible.



1.

Press lock and open release clip in direction of arrow.

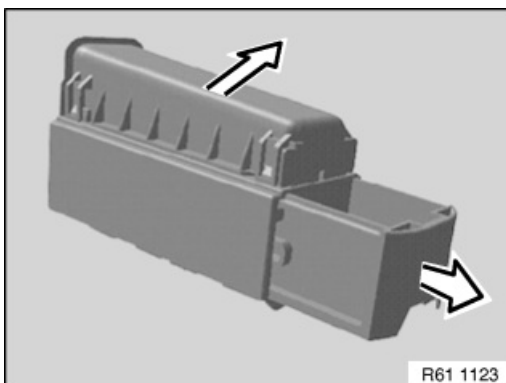
Disconnect plug connection.



2.

Press lock and open release clip in direction of arrow.

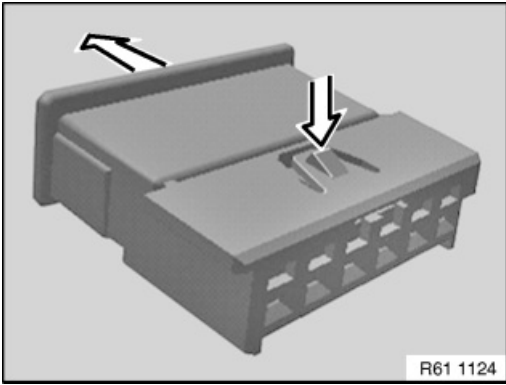
Disconnect plug connection.



3.

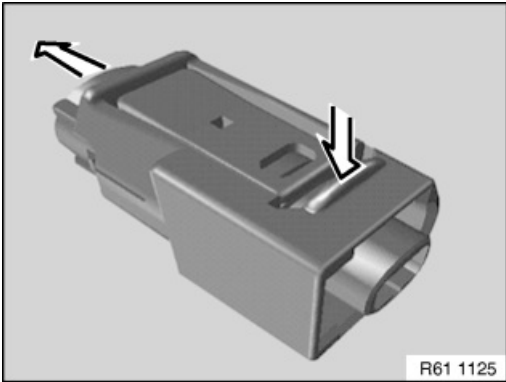
Open release clip in direction of arrow and disconnect plug connection in direction of arrow.





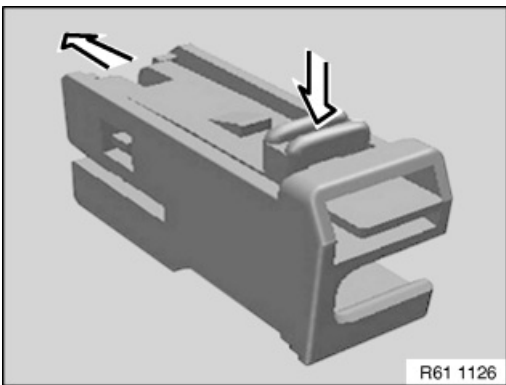
4.

Press lock and disconnect plug connection in direction of arrow.



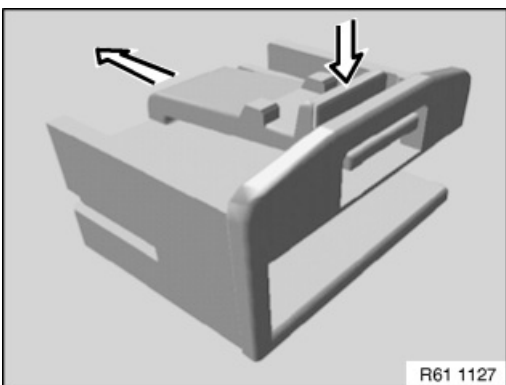
5.

Press lock and disconnect plug connection in direction of arrow.



6.

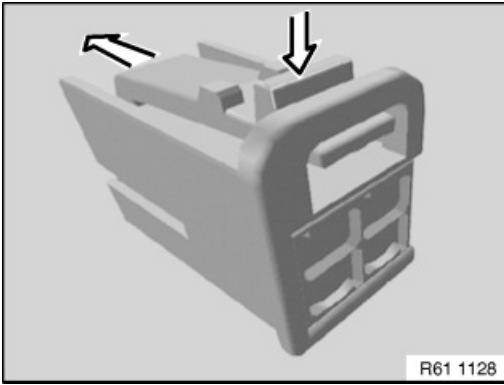
Press lock and disconnect plug connection in direction of arrow.



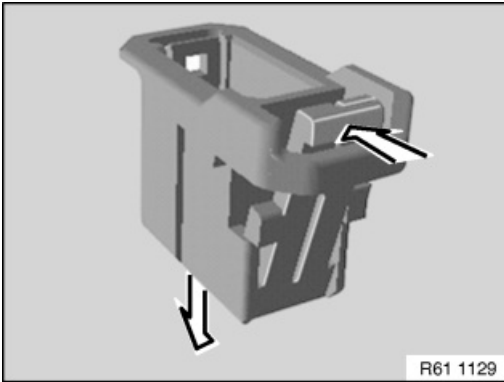
7.

Press lock and disconnect plug connection in direction of arrow.

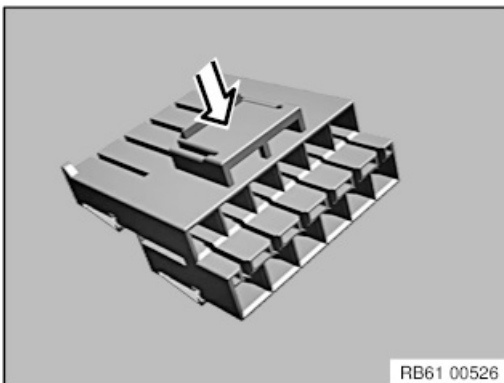




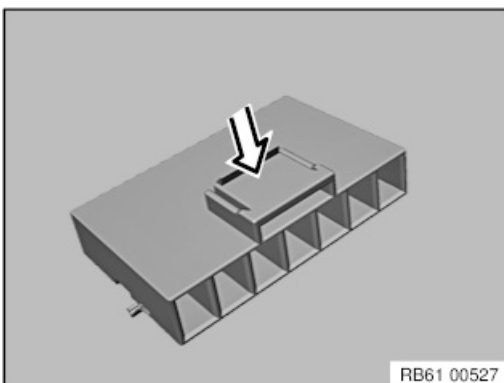
8.
Press lock and disconnect plug connection in direction of arrow.



9.
Press lock and disconnect plug connection in direction of arrow.

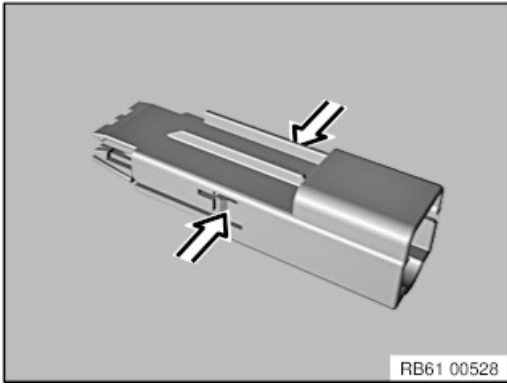


10.
Press the lock and detach plug connection.



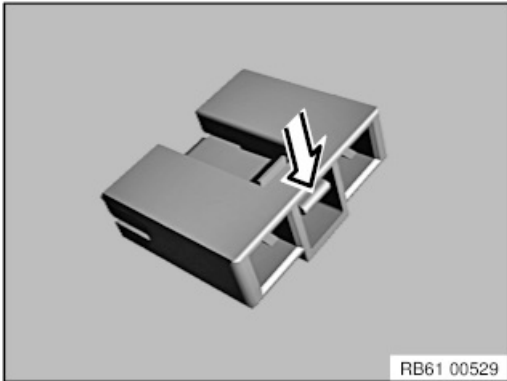
11.
Press the lock and detach plug connection.





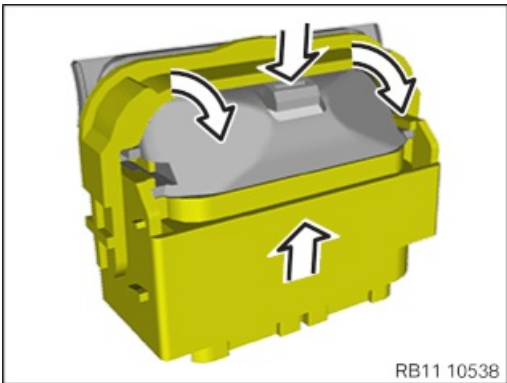
12.

Press the lock on both sides and detach plug connection.



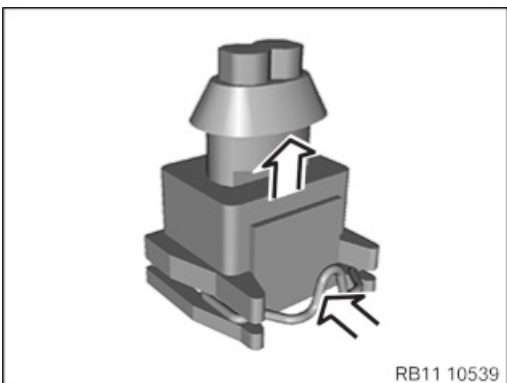
13.

Press the lock and detach plug connection.



14.

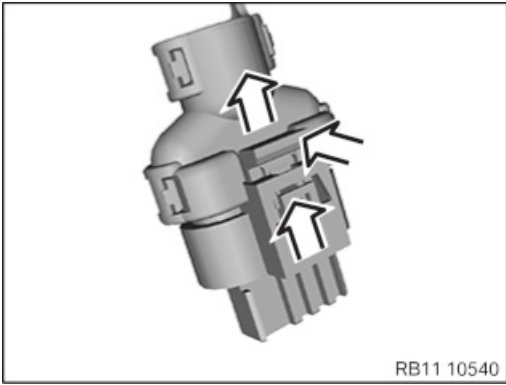
Press lock and open release clip in direction of arrow.
Disconnect plug connection.



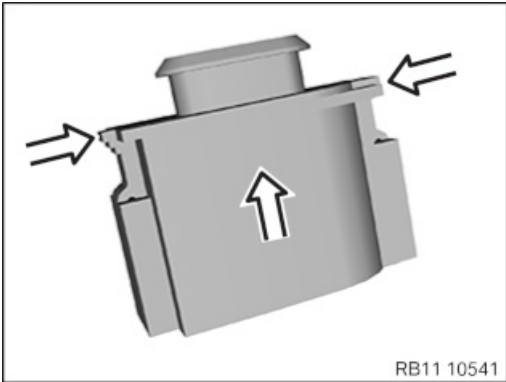
15.

Press the lock and detach plug connection.

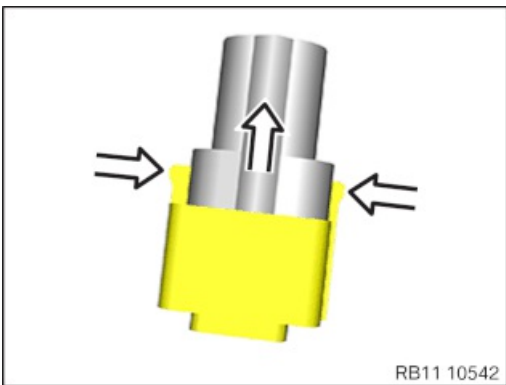




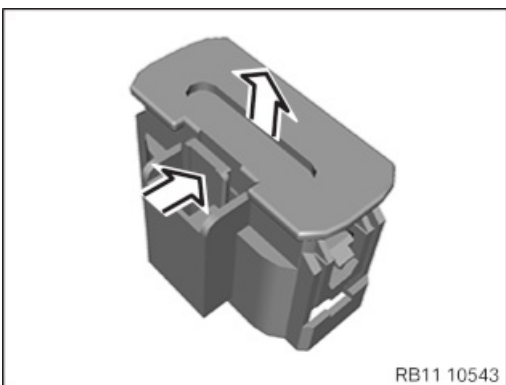
16.
Pull out lock and press.
Disconnect plug connection.



17.
Press the lock and detach plug connection.

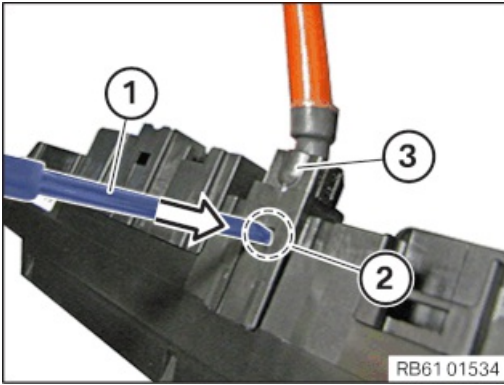


18.
Press the lock and detach plug connection.



19.
Press the lock and detach plug connection.



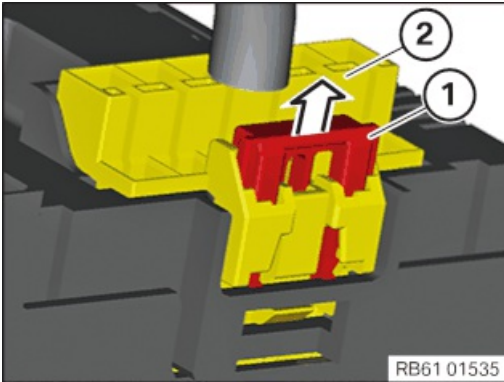


20.

Plug connection, e.g. on the power distribution box:

Press into the opening (2) using a suitable tool (1).

Pull off plug connection (3) upwards.

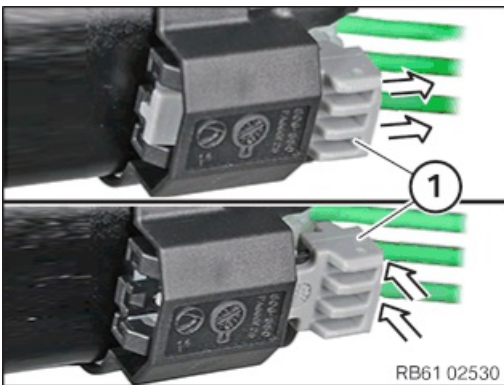


21.

Plug connection, e.g. on the power distribution box:

Lift lock (1) with a suitable tool.

Pull off plug connection (2) upwards.



22.

Vibration resistant high power engine contacts:

Caution!

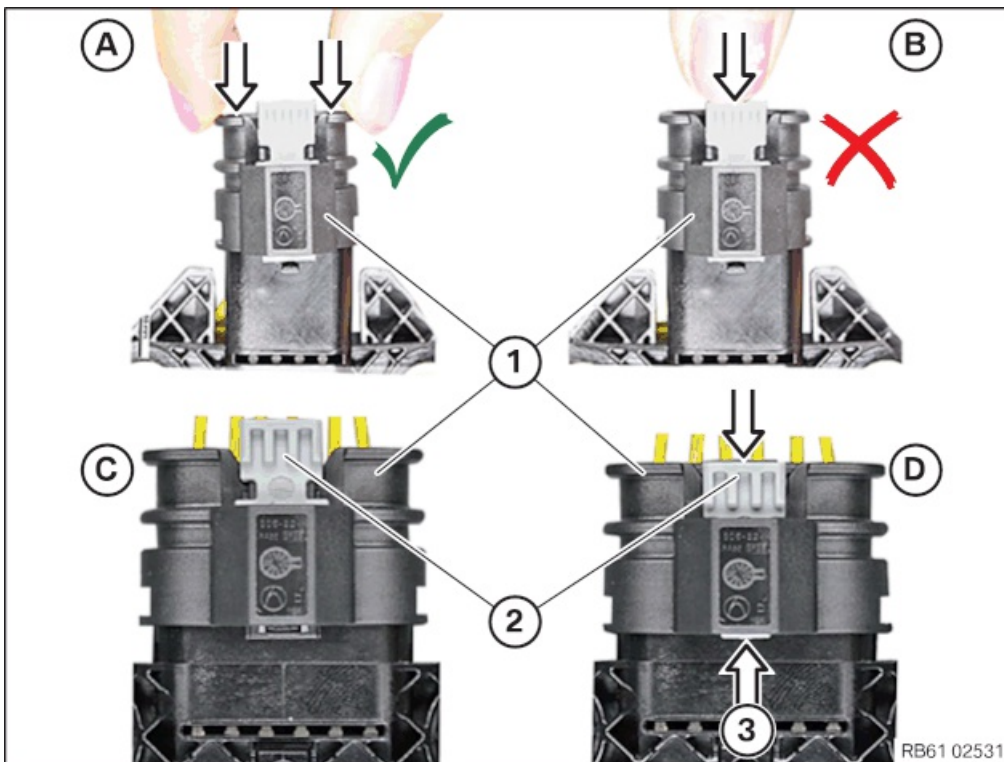
For this connector type, increased forces come into play when disconnecting and closing.

Disconnect:

Pull out lock (1) downward in direction of arrow first.

Then press lock (1) down in direction of arrow and pull off connector.



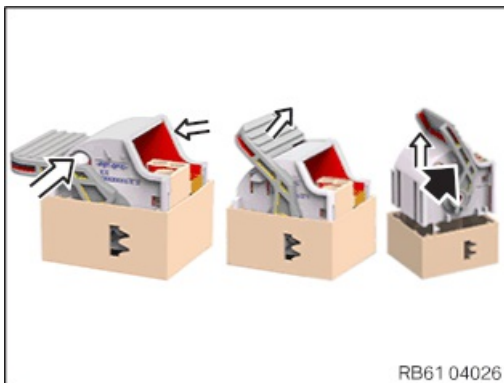


23.

Close:

- A. Press the connector (1) down at the points indicated by the arrow **until it reaches the end position**
- B. **Do not** press the connector (1) further than the lock
- C. Connector (1) is in the end position, but lock (2) is not yet locked
- D. Press lock (2) down in the direction of the arrow until the tip of lock (2) is visible at point (3)

Unlock / lock front light combination plug connection & replace housing after damage:

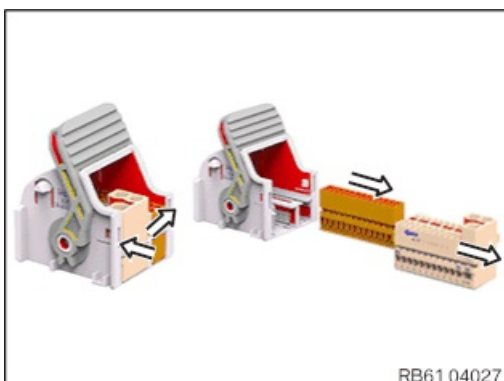


24.

Press in locking lever at both sides until the lever is unlocked and can be moved.

Move lever upwards until it latches into place in the end position.

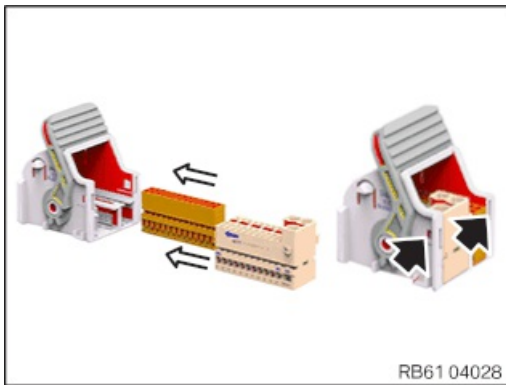
Once the lever is locked in the end position, remove plug connection upwards.



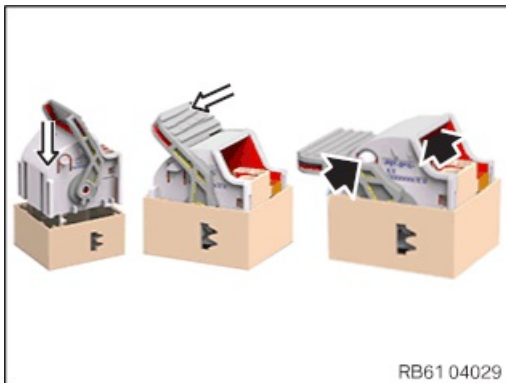
Unlock socket housing by lifting up each of the locking tabs.

Slide out after unlocking the socket housing.

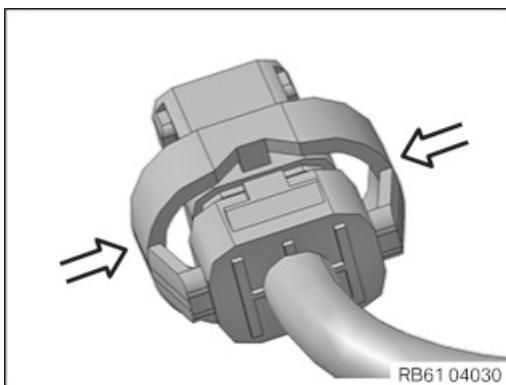




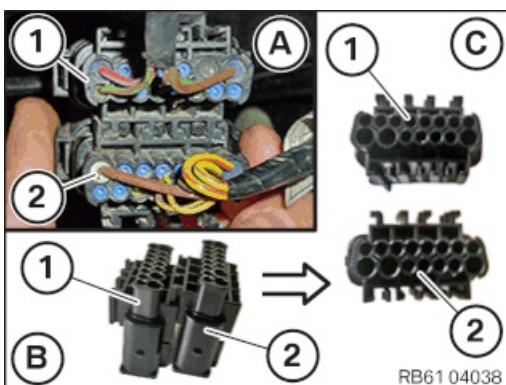
Slide in socket housing up to limit position.
Lock socket housing into place in end position.



Sliding in up to limit position.
Activate plug-in procedure by moving lever downwards.
IMPORTANT: the latch mechanism on both sides only works for a completed plug-in procedure.



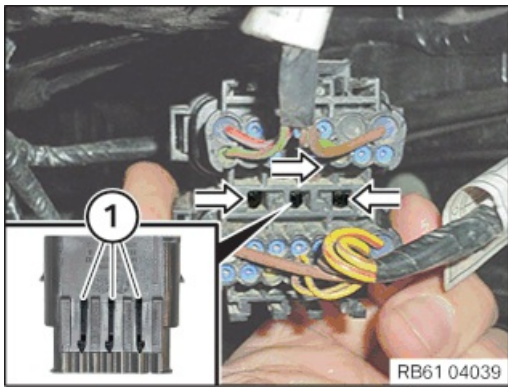
25.
Rosenberger D4S20G-400A5-Y
Press to unlock on both sides.



26.
Pin housing, 15-pinMLK1

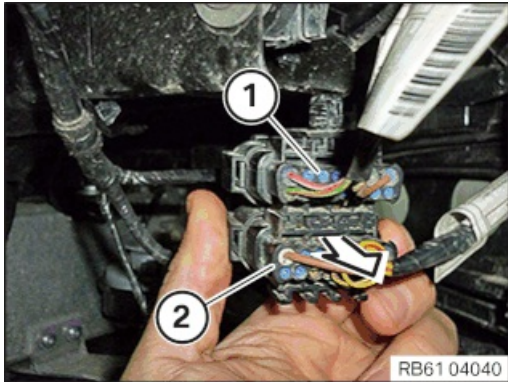
- A & B. To avoid any damage to individual connectors, the given connector assembly consisting of several individual connectors (1) & (2) must be released before disconnecting the plug connection.
- C: released connector assembly





Disconnecting connector assembly:

Release retaining hooks (1) in direction of arrow (detail image shows retaining hooks of individual connector).



Release connector (2) in direction of arrow from connector (1).

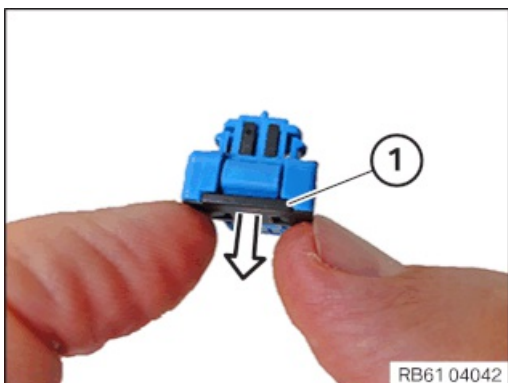


27.

Airbag ignition circuit connector

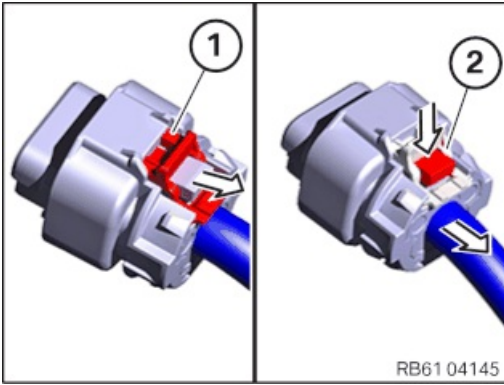
Warning!

Note the safety information for working on vehicles with airbag systems prior to disconnecting the plug connection.



Pull the cap (1) in the direction of the arrow to unlock



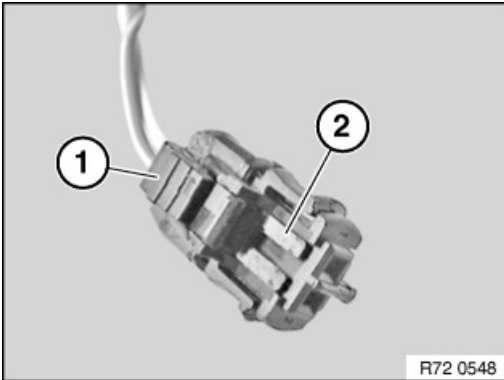


28.

Connector e.g. on front and rear lighting unit

Open safety catch (1) in direction of arrow using appropriate tool.

Push safety catch (2) in direction of arrow and disconnect plug connection.



29.

Plug, e.g. in airbag ignition circuits

Press the lock (1) and pull out the connector (2) up to initial engagement position.

Pull off connector (2).



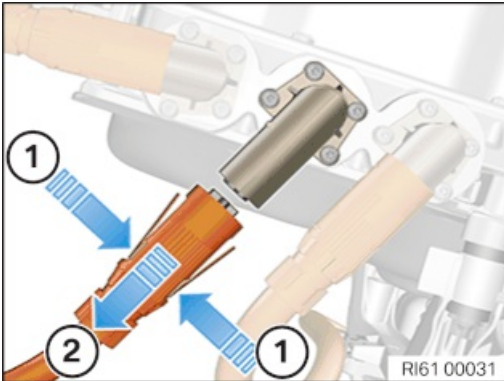
61 13 ... Unlocking and disconnecting various plug connections in electrical and hybrid vehicles



Attention!

Observe the following instructions for handling high-voltage plug connections:

- Damaged high-voltage plug connections must be replaced completely. Repair is not permitted.
- Dirt contamination must be removed before opening the plug connection.



Disconnect the Hirschmann high-voltage connector:

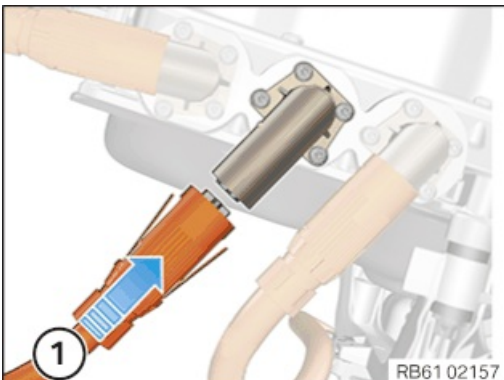
Press the lock (1) on the left and right on the connector in the direction of the arrow.

Pull off connector (2) in direction of arrow.

Attention!

Connector (2) is difficult to pull off.

In the event of damage to high-voltage connector (2), the complete high-voltage cable must be replaced!

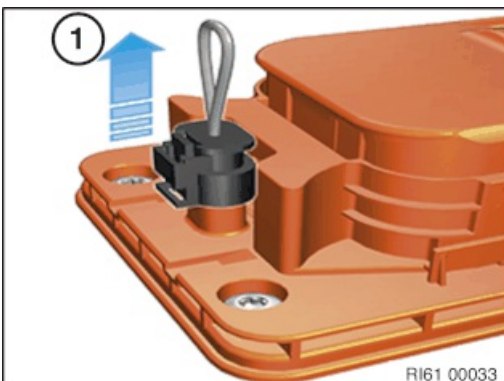


Connect the Hirschmann high-voltage connectors:

Slide the connector (1) on in the direction of the arrow.

Note:

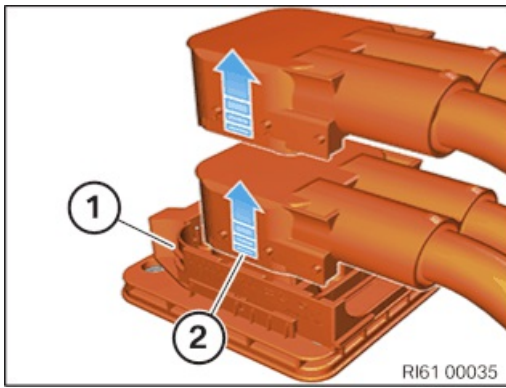
Connector (2) must lock audibly.



Disconnect the Kostal high-voltage connector:

Unlock and disconnect high-voltage interlock loop (1).





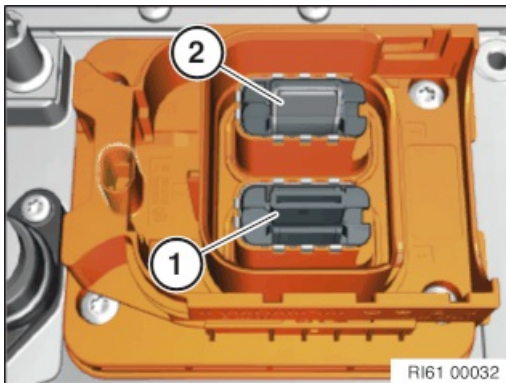
Push the lock (1) fully to the front.

Lift the connector (2) and remove it entirely.

Attention!

Plug connection (3) is difficult to pull off.

The connector (2) must be completely pulled off the opposite housing in one step. Damage may be caused to contact protection if connector is only partly pulled off and then closed again!



Check the Kostal high-voltage connector and connection for damage:

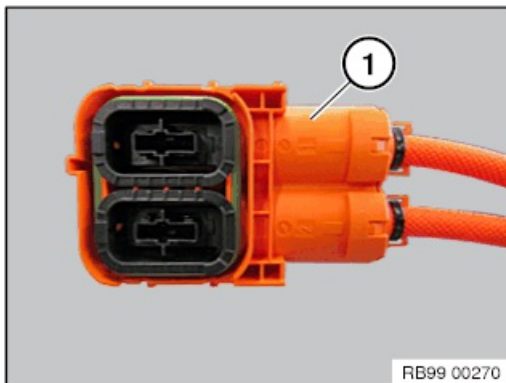
Check the touch protection for damage and correct positioning (1).

Warning!

Do not touch unprotected connector (2)!

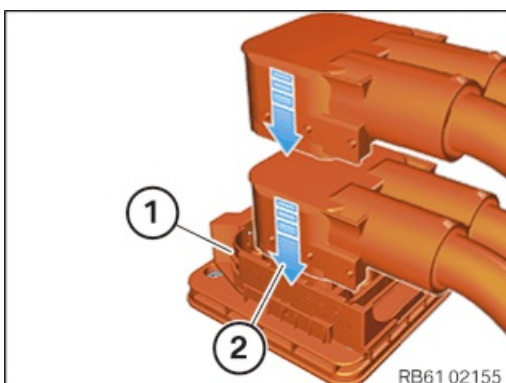
If the contact protection (1) has been pushed to the bottom (2), the high-voltage connector must be refitted.

If contact protection (1) remains in bottom position (2) after reinstallation, the contact protection is faulty and the component must be replaced!



Check the high-voltage connector (1) for damage. **Warning!**

In the event of damage to the high-voltage connector (1), the complete high-voltage cable must be replaced!



Connect the Kostal high-voltage connector:

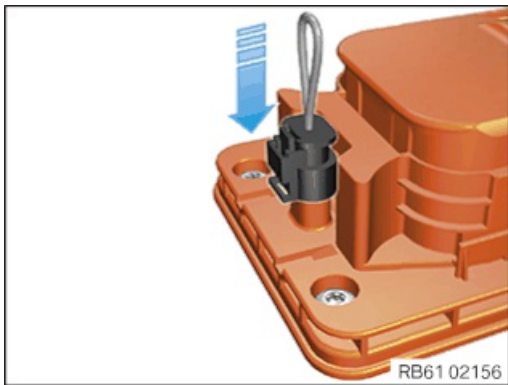
Connect the connector (2) in one single movement to the counter-housing.

Push the lock (1) fully to the rear.

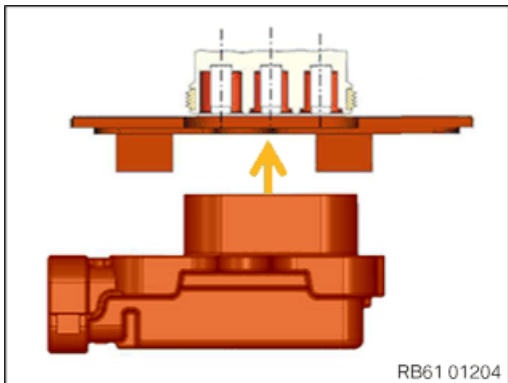
Attention!

Plug connection (3) must be correctly locked by lock (2), otherwise there is a risk of damage.



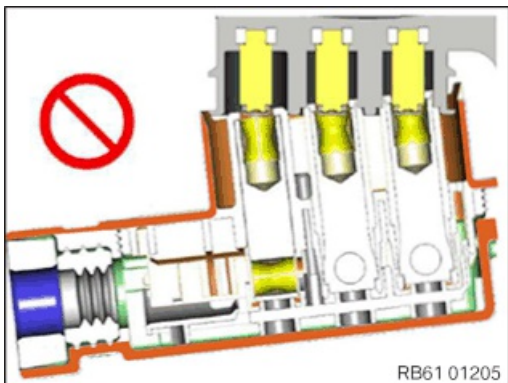


Connect the connector for the high-voltage interlock.



Three-phase high-voltage connector:

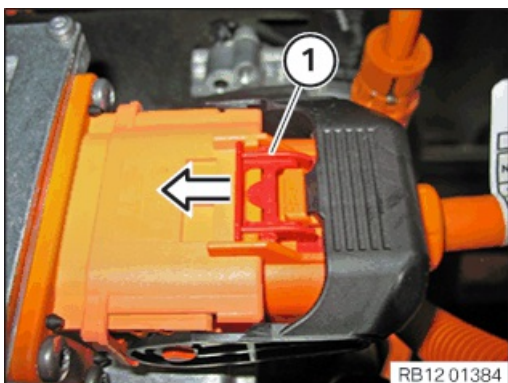
Connect and disconnect the connector straight.



Attention!

The system is designed to only offer limited protection against damage caused by connectors that are inserted at an angle.

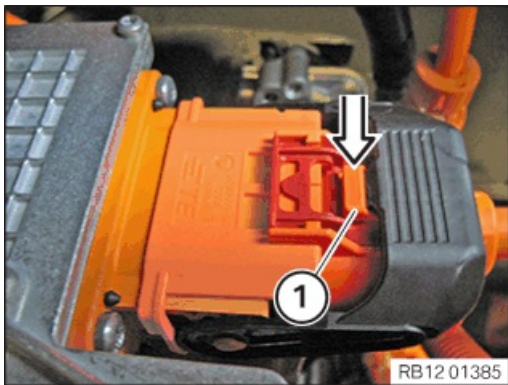
Increased tilted connections will increase the connecting force and the risk of danger.



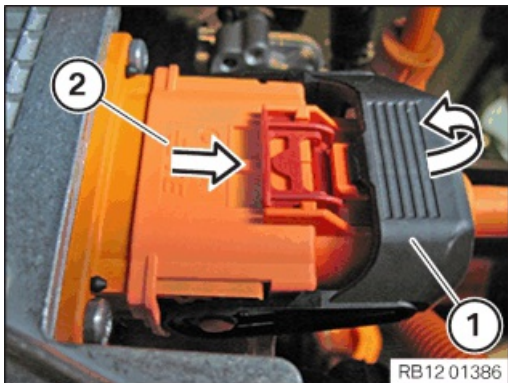
Disconnect the high-voltage connector from the high-voltage connection of the KLE:

Slide lock (1) in direction of arrow up to stop.

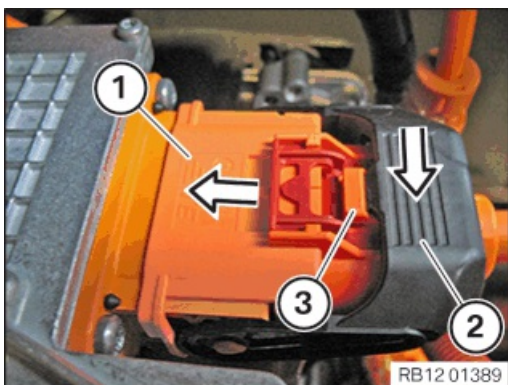




Press lock (1).



Open the lock (1) completely and disconnect the connector (2).



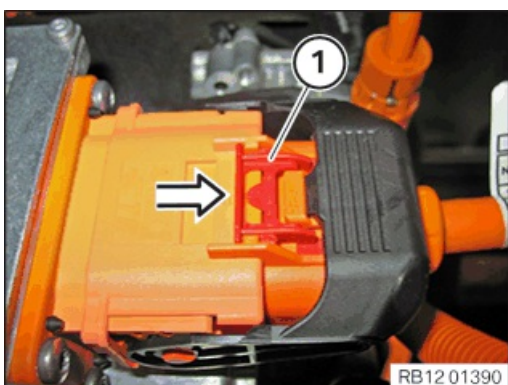
Connect the high-voltage connector to the high-voltage connection of the KLE:

Connect the connector (1) to the limit position and close the lock (2).

Attention!

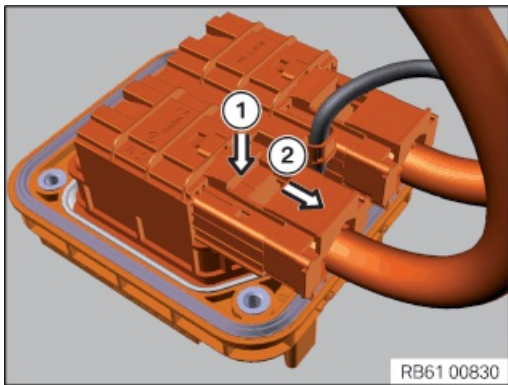
Lock (2) must snap audibly into place.

The retaining lug of the lock (2) must be positioned completely under the lock (2).



Slide the lock (1) on to the stop in the direction of the arrow.





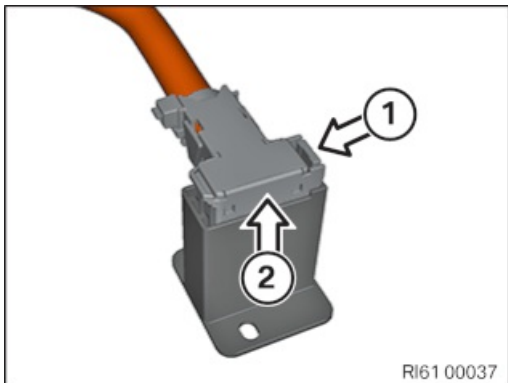
High-voltage connector on the high-voltage connection of the high-voltage battery unit:

Press down unlocking (1) in direction of arrow and pull off connector in direction of arrow (2).

Attention!

Contact protection is no longer provided in the event of a damaged connector housing.

In this case, contact technical support.



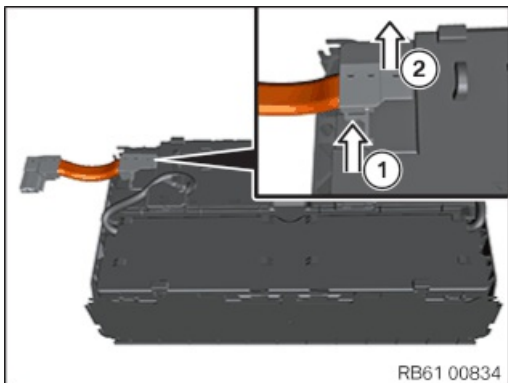
High-voltage connector on the cell module I01:

Press unlocking device (1) together and pull off connector upwards (2).

Attention!

Contact protection is no longer provided in the event of a damaged connector housing.

In this case, contact technical support.



High-voltage connector on the cell module (cell module connecting line):

Press unlocking (1) in direction of arrow and pull off connector in direction of arrow (2).

Attention!

Contact protection is no longer provided in the event of a damaged connector housing.

In this case, contact technical support.

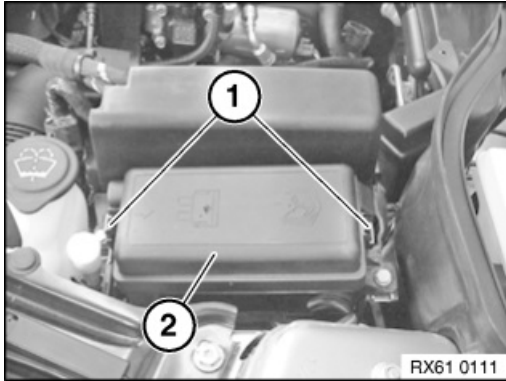


61 13 055 Removing and installing (replacing) fuse box for engine compartment

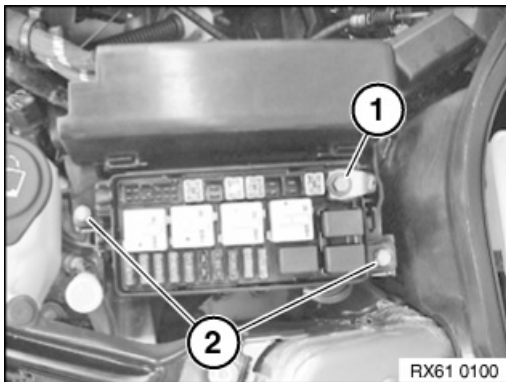


Necessary preliminary tasks:

- Disconnect battery earth lead



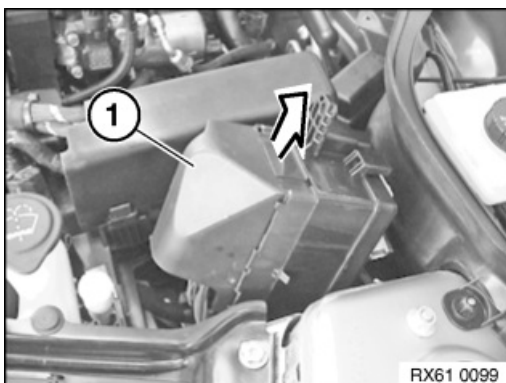
Unlock latch mechanisms (1) and remove fuse box cover (2).



Release screw (1) and remove terminal shoe. Tightening torque 61 13 4AZ.

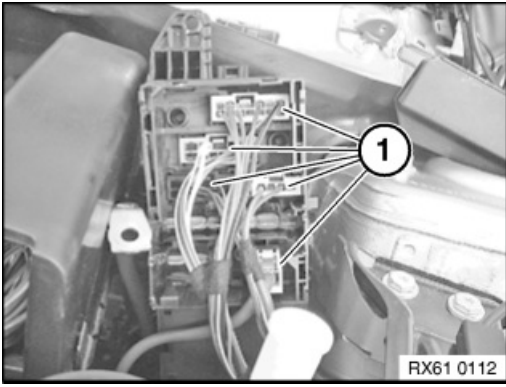
Unfasten screws (2). Tightening torque 61 13 1AZ.

Raise the fuse box.



Remove protective cap (1).





Disconnect all plug connections (1) from the bottom of the fuse box.

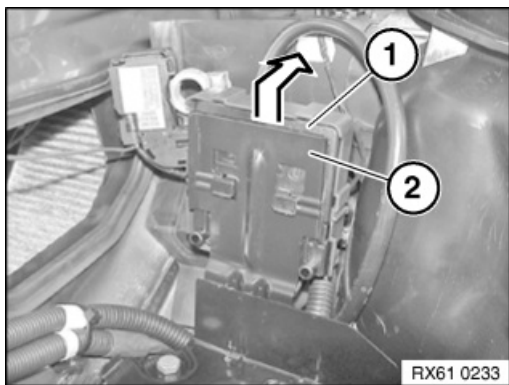
Replacement:

- Modify the fuses and relay



**Necessary preliminary tasks:**

- Remove right cowl panel cover
- Disconnect negative battery cable

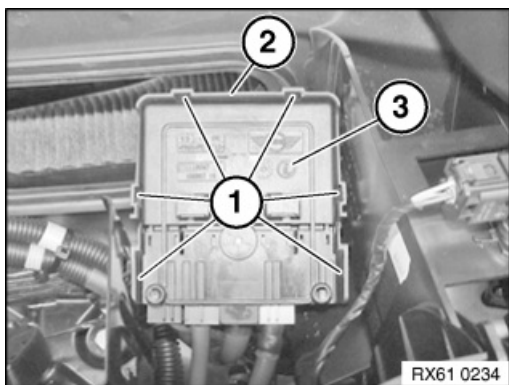
*Note:*

Battery shown removed for purposes of clarity.

Pull B+ distributor (1) in direction of arrow out of bracket (2).

Installation note:

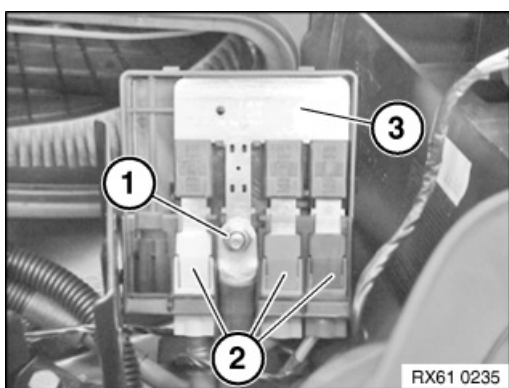
Make sure B+ distributor (1) is correctly engaged on bracket (2).



Unlock catches (1) with a suitable tool and remove B+ distributor lid (2) towards rear from B+ distributor (3).

Installation note:

Make sure B+ distributor lid (2) is correctly seated on B+ distributor (3).



Slacken nut (1). Tightening torque 61 14 1AZ.

Disconnect plug connections (2) and remove B+ distributor (3).

Installation note:

Connectors are colour- and mechanically coded.

Ensure correct contacting.

B+ distributor can only be replaced as a complete unit (with fuses).



61 00 ... Battery charging calendar

Battery charging calendar 2016 (PDF file)

Battery charging calendar 2017 (PDF file)

Battery charging calendar 2018 (PDF file)

Battery charging calendar 2019 (PDF file)

Information for the battery charging calendar



61 00 ... Battery log form

Battery log form 2016

Battery log form 2017

Battery log form 2018

Battery log form 2019



61 20 ... Battery replacement information

A vehicle battery is constructed for the installation location and the individual power requirements of the particular vehicle. These individual power requirements depend on the motorisation and different types of optional equipment. The individually assigned vehicle battery is the ideal compromise between the power requirements of the vehicle electrical system and the weight and service life of the vehicle battery.

If the vehicle electrical system of electric vehicles is not accessible due to a faulty 12 V battery, proceed as follows:

Battery exchange in electrified vehicles

Vehicles with the automatic engine start-stop function or particular engine types and optional equipment are equipped with a special vehicle battery (AGM battery), since only this battery type can provide elevated power requirements over the extended service life. Installing a different vehicle battery can cause problems with vehicle electronics, can reduce functions or can cause leakage of battery acid.

In the event of an accident where the airbags are deployed in vehicles with a vehicle battery in the luggage compartment, the electrical connection between the vehicle battery and the trigger is automatically disconnected through pyrotechnics. This prevents possible short-circuiting.

Proper operation of all of these safety and convenience functions requires a battery that conforms with specifications and that is properly registered in vehicles with energy management systems (IBS, power module).

Vehicles with energy management systems (IBS, power module): Register battery exchange.

The vehicle electrical system is informed about the vehicle battery characteristic data, such as type, size, age and current power capacity. Therefore, there will always be only one work scope provided that is permitted by the current status of information.

When installing a new vehicle battery, the battery must be registered and thus must also be registered with the vehicle electrical system.

Diagnosis system:

Register battery exchange.

- Service functions
- Body
- Voltage supply
- Register battery exchange

When retrofitting, a more powerful battery may be used. Standard batteries may always be replaced by AGM batteries with the same specifications.

When installing a battery of a different size or a different battery type, this change in vehicle data must be programmed into the vehicle data in accordance with specifications.

Programming system:

- Battery retrofitting



**Important!**

Observe safety informations for handling vehicle battery.



There are two ways to carry out a voltage interruption of the 12-V battery:

1. Manually by disconnecting the battery earth lead
2. With the diagnosis system

1. Manually: Carry out the following steps:

- Switch off and disconnect battery charger
- Turn off ignition.
For vehicles with ignition key: Ignition key in neutral position
Vehicles with ID transmitter: Remove ID transmitter from slot
For vehicles with Comfort Access: Secure terminal 30
- Disconnect negative battery lead
- Reconnect battery earth lead (to ensure bus activity)
- Observe a waiting period of 5–10 s
- Disconnect negative battery lead
- Observe a waiting period of approx. 1 minute
- Connect battery earth lead
Tightening torque: 61 21 1AZ
- Connect and switch on battery charger
- Switch on ignition.

2. With the diagnosis system:

- 03 Body
- Voltage supply
- Activate rest state
- Power-down command



61 20 900 Disconnecting and connecting battery earth lead

1 – Disconnecting the battery earth lead

Prerequisite

Ignition is switched off.



RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.



TECHNICAL INFORMATION

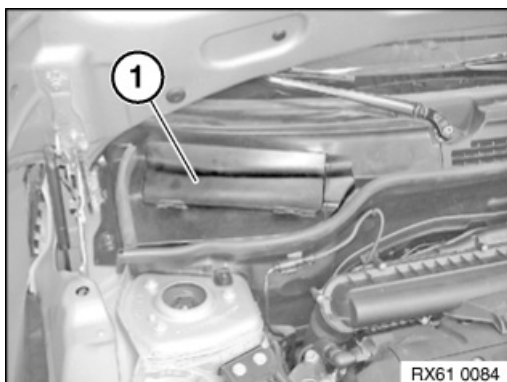
Observe the notes on handling the vehicle battery.

For additional information see:

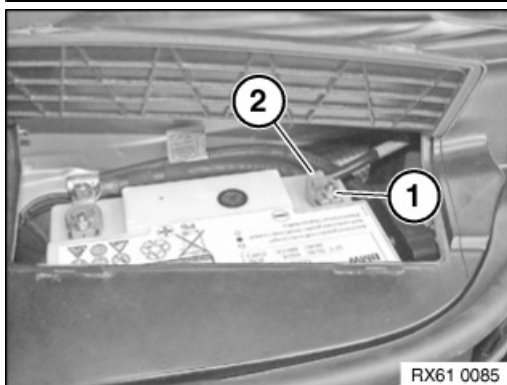
61 00 ... Safety information on handling the vehicle battery

61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery

61 12 ... Notes on the intelligent battery sensor (IBS)



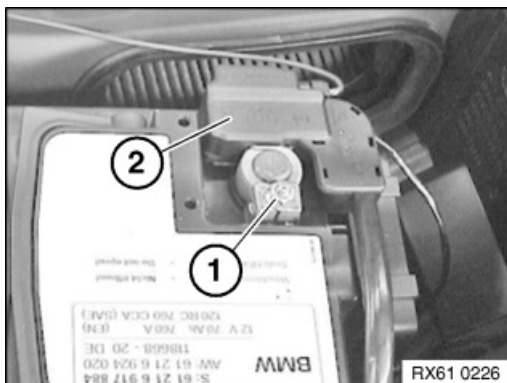
- Open the cover (1).



- **Equipment specification without the intelligent battery sensor (IBS):**

Slacken nut (1).

Remove the battery earth lead (2) and secure to one side.



- **Equipment specification with the intelligent battery sensor (IBS):**

Slacken nut (1).

Remove the battery earth lead (2) and secure to one side.



2 – Connecting the battery earth lead

RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.

TECHNICAL INFORMATION

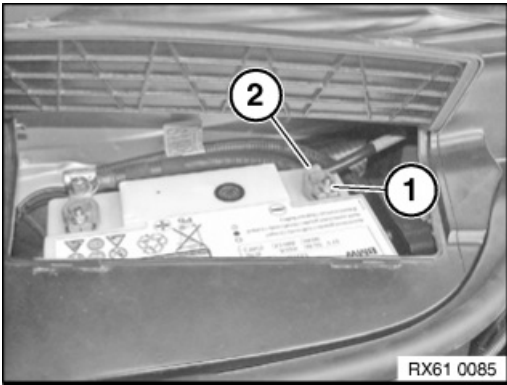
Observe the notes on handling the vehicle battery.

For additional information see:

61 00 ... Safety information on handling the vehicle battery

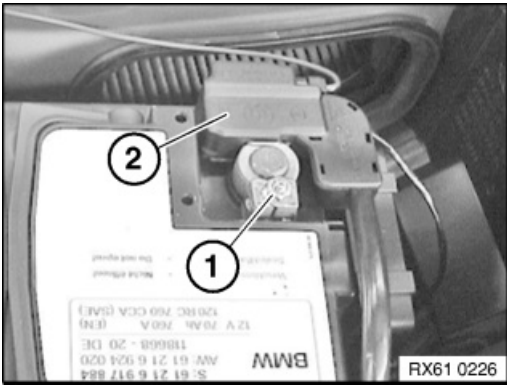
61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery

61 12 ... Notes on the intelligent battery sensor (IBS)



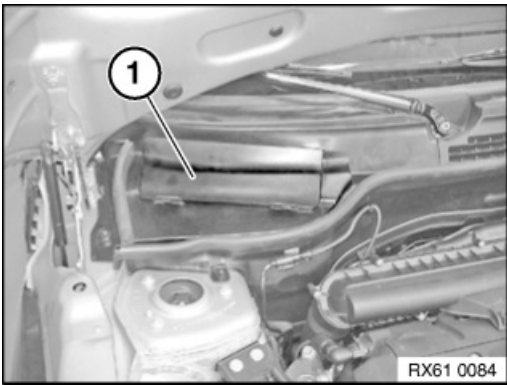
- **Equipment specification without the intelligent battery sensor (IBS):**
Place the battery earth lead (2) on the negative battery terminal.
Tighten nut (1).

Battery terminal	5 Nm
-------------------------	------



- **Equipment specification with the intelligent battery sensor (IBS):**
Place the battery earth lead (2) on the negative battery terminal.
Tighten nut (1).

Battery terminal	5 Nm
-------------------------	------



- Close the cover (1).

Additional Information

Overview of Tightening Torques



	5 Nm
--	------

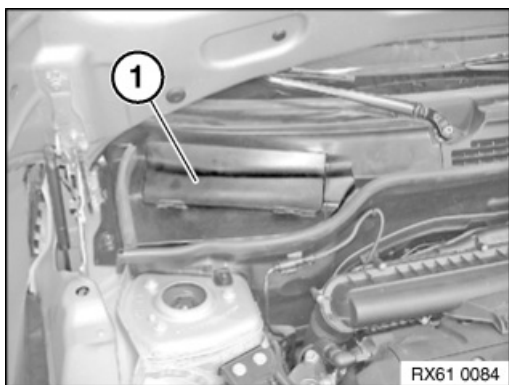


**Warning!**

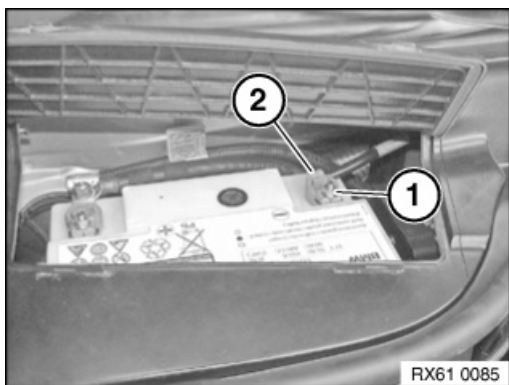
Follow safety regulations for handling vehicle battery.

Follow instructions for disconnecting and connecting battery.

Follow instructions on intelligent battery sensor (IBS).



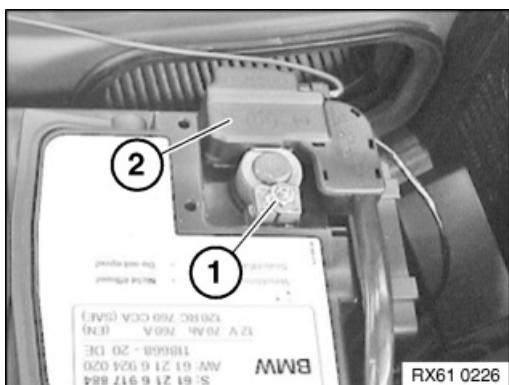
Open cover (1).

Version without intelligent battery sensor (IBS):

Loosen nut (1).

Tightening torque 61 21 1AZ.

Disconnect battery earth lead (2) and secure at side.

Version with intelligent battery sensor (IBS)::

Loosen nut (1).

Tightening torque 61 21 1AZ.

Disconnect battery earth lead (2) and secure at side.



61 12 ... Information on intelligent battery sensor (IBS)

Notice! Do not connect the charger to the 12 V charging socket

The 12 V charging socket is supplied with voltage by the rear power distribution box via relay. This relay drops out after terminal 15 OFF. This means that a trickle charger connected at the 12 V charging socket will be disconnected from the battery. Only charge the battery via the jump start terminal point. Only then can the voltage supply be registered by the vehicle.

Warning! Danger of destruction in event of mechanical strain

- Do not introduce any additional connections at the battery negative terminal.
- Do not modify the grounding cable. The ground cable also serves heat dissipation.
- Do not establish any connection between the IBS and the sensor screw.
- Do not use force when disconnecting the pole shoe from the battery terminal:
 - Do not pull on the ground cable.
 - Do not place any tools under the IBS to lever off the pole shoe.
- Do not use IBS connections as levers.
- Use a torque wrench and set tightening torque in accordance with repair instructions.
- Do not release or tighten down sensor screw (Torx screw).
- Avoid contact between IBS and ground.

Warning! Danger of destruction to IBS and wiring upon battery replacement

- The IBS and wiring can be destroyed by mechanical strain upon battery replacement. Therefore avoid mechanical strain.
- The size (capacity) of the battery required for the car is coded in the Car Access System (CAS).
- Use the battery size (capacity) installed as standard upon battery replacement.
- Recode the Car Access System (CAS) when installing a battery with a different capacity.
- Register battery replacement via Service functions in diagnosis system.
- Delete fault code entries in the Digital Engine Electronics (DME) associated with battery replacement.
- Always proceed in accordance with the repair instructions.

Note: Battery draining possible in spite of the intelligent battery sensor IBS being fault-free.

- A battery can be drained (e.g. with lights or radio switched on) even when the IBS functions perfectly in conjunction with power management.
- **For this reason, only exchange the IBS when there is a corresponding fault code entry!**



12 00 ... Notes for disconnecting and connecting battery

Observe safety informations for handling vehicle battery.

Before disconnecting battery:

Turn off the ignition and other electrical loads/consumers to prevent sparking when reconnecting.

Note:

If the ignition is not turned off when the battery is disconnected, fault memories may be set in some control units.

Attention!

- There is a danger of mixing up battery cables: If the positive battery cables and negative battery cables are the same colour and you are in doubt, follow the polarity to the battery, then mark and cover the wires.
- On vehicles with radio code: After disconnecting the battery, the radio code must be re-entered. Therefore obtain the radio code card from the customer beforehand. Note stored stations and restore them after connecting the battery.
- Stored settings of the on-board computer and clock will also be lost.
- All available ignition keys with infrared transmitter must be recoded for vehicles with first generation infrared central locking.

General notes on disconnecting battery:

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- On vehicles with IBS at negative battery terminal:
Do not under any circumstances pull/lever off pole shoes by force.
Do not under any circumstances release the hexagon socket screw of the IBS.
- Detach the terminal of the battery earth lead from the vehicle battery and the auxiliary battery if available. Cover battery negative terminal(s) and secure.
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the battery is connected.
- When installing battery terminal: Tightening torque 61 21 1AZ.

After connecting battery:

Attention!

The scope of application of some systems may be restricted after an open circuit.

Likewise, individual settings may be lost.

Settings or activations must be carried out, depending on the equipment specification.

For example:

- Vehicles with automatic engine start-stop function (MSA):
MSA function is active only after teach-in time (vehicle must not be woken for a period of approx. 6 hours) > if necessary, notify customer of the situation
- E46 (all-wheel drive vehicle) / E53 / E83: Carry out steering angle sensor adjustment
- Activate slide/tilt sunroof, if necessary
- If necessary, activate power windows
- If necessary, activate mirror with compass
- Only E60, E61, E63, E64, E70, E71, E90, E91, E92, E93: mount steering angle

Vehicles with a two-battery system

Starter and system battery



A circuit for the starter battery and a circuit for the system battery are part of a two-battery system. An auxiliary control unit monitors both circuits. Depending on the situation, the circuits are connected to or isolated from the auxiliary control unit via a cut-off relay.

Two AGM batteries, whose design and properties are described in AGM batteries, are used as a storage battery.

Attention!

These batteries must not under any circumstances be charged with a voltage in excess of 14.8 V. Rapid programs must not be used either.

Receiving/giving starting aid via jump start terminal point

The engine can be jump-started with an external voltage supply via the jump start terminal on the right side of the engine compartment.

Note:

The starter battery is isolated from the alternators when the bonnet is open.

Giving starting aid via the jump start terminal point is thus limited by the capacity of the starter battery when bonnet is open.

Charging starter and system batteries via jump start terminal point

The starter battery is charged as a matter of priority with a charger connected to the jump start terminal. The voltage at the starter battery is the decisive factor in determining whether the system battery is also included in the charging operation. The auxiliary control unit automatically detects a charging operation at a charging voltage at the starter battery of ≥ 13.5 V. The cut-off relay is closed and thus the system battery is connected in parallel. Both batteries are now charged.

Prerequisite:

- Terminal 61 inactive
- Terminal 15 inactive

If terminal 15 becomes "active" during the charging procedure, the cut-off relay is opened immediately and again only the starter battery is charged.

Note:

When the bonnet is open, the cut-off relay is also opened in normal operation when the engine is running.

A special mode can be set by means of diagnosis for workshop/garage operation. The cut-off relay is closed from terminal R in this operating mode. This mode is automatically reset once a distance of 5 km has been driven.

Trickle charging

The increased standby current consumption can be compensated for via the jump start terminal point with the aid of the "Acctiva easy" trickle charger (Service Information 2 03 05 205).

Attention!

The cigarette lighter is isolated from the electrical system after terminal R "OFF" on a timed basis (60 mins.), thereby interrupting charging of the system battery via the cigarette lighter. This is prevented if the battery switch (on the right side of the luggage compartment behind the trim panel) is turned on and off again twice within 2 seconds.



61 00 ... Notes for disconnecting and connecting the vehicle battery

Observe safety informations for handling vehicle battery.

Before disconnecting vehicle battery:

Turn off the ignition and other electrical loads/consumers to prevent sparking when reconnecting.

Note:

If the ignition is not switched off when the vehicle battery is disconnected, fault memories may be set in some control units.

Attention!

- There is a danger of mixing up battery cables: if the positive battery cable and battery earth lead are the same colour and you are in doubt, follow the polarity to the vehicle battery, then mark and cover the leads
- The on-board computer and clock may lose your data.

General notes on disconnecting the vehicle battery:

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- Disconnect terminal of battery earth lead from the battery. Cover battery negative terminal(s) and secure.
- Disconnect both battery earth leads in version with auxiliary battery. Cover battery negative terminal(s) and secure.
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the vehicle battery is connected.
- When installing battery terminal: Tightening torque 61 21 1AZ.

Only lead AGM battery:

- On vehicles with IBS at negative battery terminal:
Do not under any circumstances pull/lever off pole shoes by force.
Do not under any circumstances release the hexagon socket screw of the IBS.

Note the following after having connected the vehicle battery:

Attention!

The scope of application of some systems may be restricted after an open circuit.

Personal Profiles may also be lost.

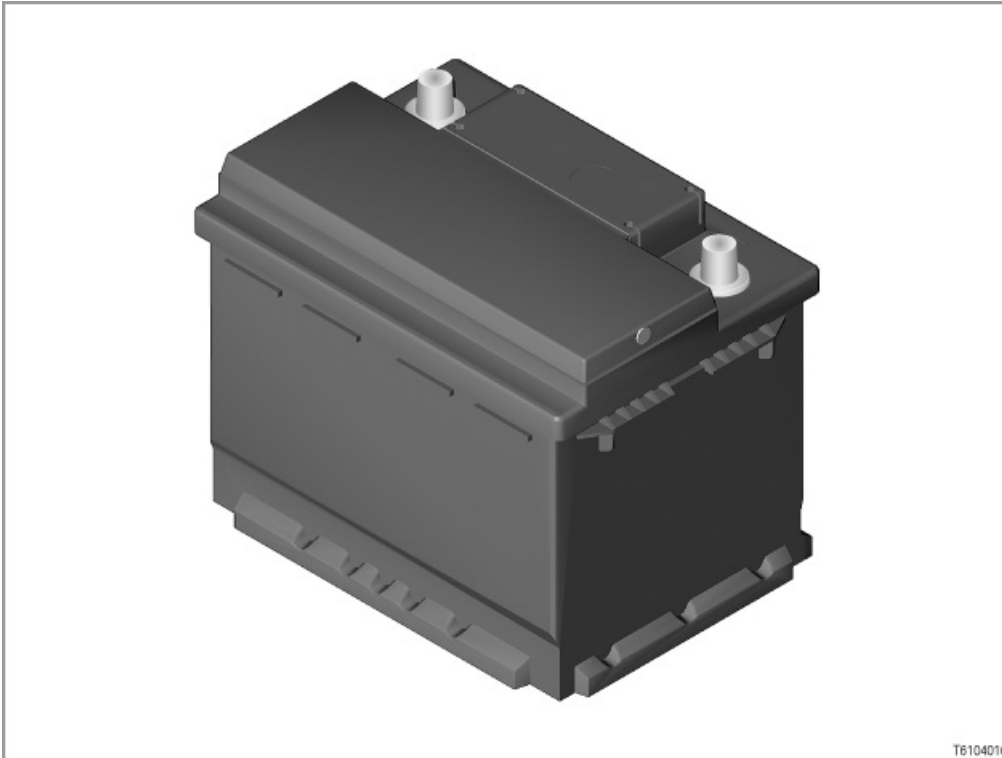
Settings or activations must be carried out, depending on the equipment specification.

For example:

- Activate slide/tilt sunroof, if necessary
- Activate power window, if necessary

Refer to the diagnosis system for further vehicle-specific information.





T6104016

Introduction

In September 2002, the first so-called VRLA batteries, better known as **AGM batteries** came into use. (VRLA stands for **V**alve **R**egulated **L**ead **A**cid, i.e. lead-acid battery with pressure relief valve; **AGM stands for** **A**bsorbent **G**lass **M**at, i.e. absorbent glass-fibre fleece).

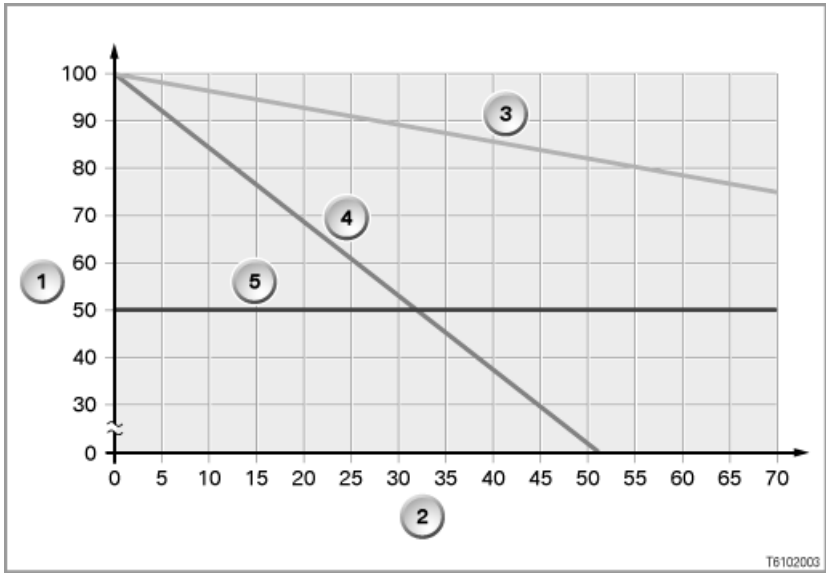
The constantly increasing energy demand of modern vehicle electrical systems calls for ever more powerful battery solutions. A modern luxury-class vehicle has some 100 actuator motors that have to be fed with electrical current. Added to these are safety, environmental and comfort elements which are increasingly becoming standard features, such as e.g. Antilock Brake System (ABS), Dynamic Stability Control (DSC), steering assistance (EPS), electronic chassis and suspension control, air conditioning and navigation system. Current consumption is considerable even when the vehicle is not in use.

The somewhat higher price compared with a battery of similar size is fully balanced by the following benefits:

- greatly longer service life
- improved starting reliability at low temperatures
- reliable starting of engines with high starting current requirements, e.g. high-performance diesel engines
- 100 % freedom from maintenance
- low risk in the event of an accident (reduced environmental risk)

Service life of AGM batteries



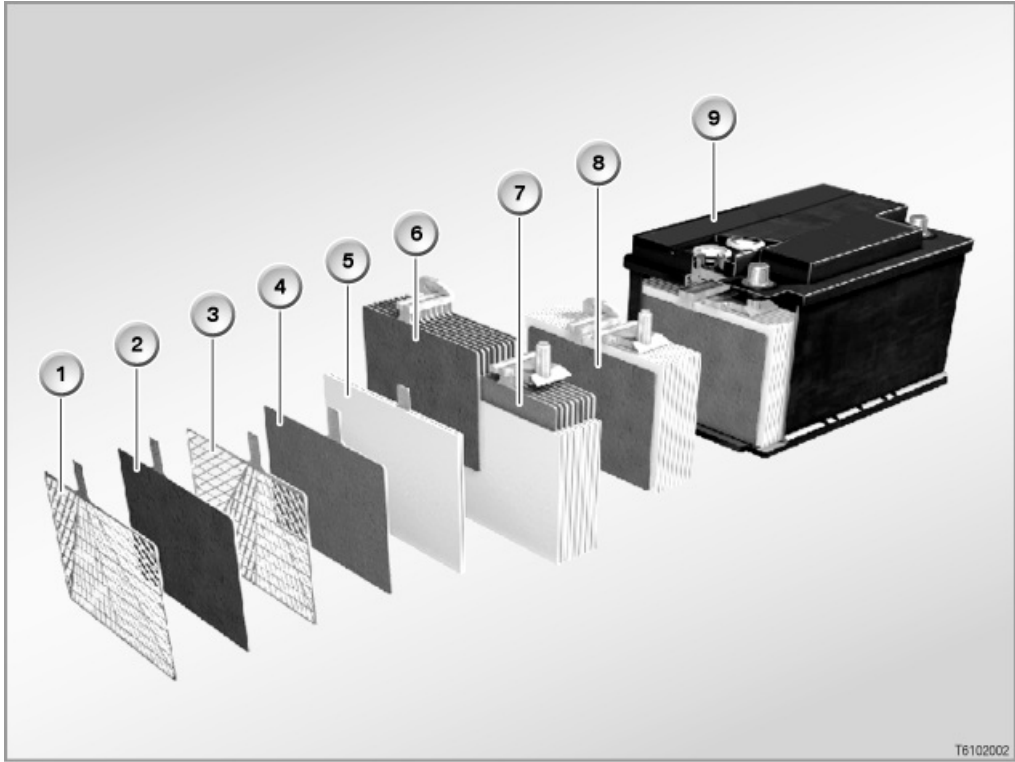


Item	Explanation	Item	Explanation
1	Available capacity [%]	2	Mileage [thousand km]
3	AGM battery	4	Lead-calcium battery
5	50 % capacity limit		

In contrast to conventional lead-calcium batteries, the sulphuric acid in a battery with fleece technology is not held freely in the battery housing. Rather, 100% of the sulphuric acid is bound into the mats of the glass-fibre fleece (separators). For this reason, no battery acid can escape if the battery housing is damaged. In addition, the AGM battery is sealed to be airtight. This is possible because the gases are converted back into water by the permeability of the separators.

Brief component description

The AGM battery has a black housing and the so-called "Magic Eye" is missing.



Item	Explanation	Item	Explanation
------	-------------	------	-------------



1	Positive grille with silver alloy	2	Positive plate
3	Negative grille	4	Negative plate
5	Separator made of glass-fibre fleece	6	Set of positive plates
7	Set of negative plates	8	Block of plates
9	Block box with base strips		

Construction

The AGM battery differs from the conventional lead calcium battery as follows:

- larger plates: Larger plates allow a 25% larger power density.
- Separators made of glass-fibre fleece: These can cause an up to 3-times higher cycle stability to be reached. This improves the cold starting capability, the power consumption and service life.
- Airtight housing with pressure relief valve (please refer to "How it works"):
The inspection plugs are sealed and can not be opened.
- Battery acid bound in glass-fibre fleece: Battery acid is not found free in the housing as before, but is rather bound 100% in the glass-fibre fleece. This gives increased security against the acid escaping and thus reduces the environmental risk.

How it works

The AGM battery differs from conventional batteries in its non-polluting and substance-retaining behaviour during charging.

When a battery is charged, the electrolysis process emits the gases oxygen and hydrogen.

- In a conventional wet lead calcium battery, the two gases hydrogen and oxygen are dissipated into the atmosphere.
- In an AGM battery, the two gases are converted back into water: The oxygen which is created at the positive electrode during charging passes through the permeable glass fibre fleece to the negative electrode. At the negative electrode the oxygen reacts with the arriving hydrogen ions in the electrolyte to form water (oxygen cycle).

In this manner, the gas and thus also the electrolyte are not lost.

Only in the event of an excessively heavy build-up of gas, i.e. excessively high pressure build-up (20 to 200 mbar), does the pressure relief valve discharge the gas. In this process, the pressure relief valve does not allow any oxygen in the air to enter. Because the pressure in the battery is regulated by a valve, the AGM battery is also known as the VRLA battery (valve-regulated lead acid).

Notes for Service department

It is necessary when handling an AGM battery to observe some particular points pertaining to battery changing and installation location.

Charging

Warning! Do not charge the AGM battery with > 14.8 V. Do not use rapid-charging programs!

When charging removed batteries (so-called stand-alone batteries), do not exceed the maximum charging voltage of 14.8 V at room temperature. Also, for charging via the external start connection point, the maximum charging voltage of 14.8 V at room temperature must not be exceeded. The battery can be damaged even if the AGM battery is only briefly charged with a charging voltage higher than 14.8 V. A charging voltage of more than 14.8 V is usually used in quick-charging routines.

Installation location

Warning! Do not install the AGM battery in the engine compartment.

The AGM battery must not be installed in the engine compartment on account of the high spatial temperature differences, otherwise its service life will be significantly shortened.

Housing



Warning! Do not open AGM batteries.

On no account may AGM batteries be opened, as the ingress of oxygen from the atmosphere would cause the battery to lose its chemical balance, rendering it unserviceable.



12 00 ... Notes/information on start assistance (jump starting)

Do not start the engine with help of starting sprays.

Preparation:

Conform with the following when starting the engine with a jump starting cable.

- Ensure that the jump starting cable wires are of appropriate cross-section size.
- Only use fuse-protected jump starting cables.
- Check whether the current-supplying battery has 12 V voltage.
- If the engine is started from the battery of another vehicle, ensure that there is no contact between the bodies of both vehicles.

Important!

Never touch electrically live ignition system components: high voltage - danger of injury!

If the battery in the vehicle supplying power is weak, start the engine of this vehicle and let it run at idling speed.

Operation:

It is essential to conform to the procedures so as to avoid injury to persons or damage to parts.

- Automatic transmission: select drive position "P", apply parking brake.
- Manual transmission: move gear lever to neutral position, apply parking brake.
- Ensure that the jump leads cannot get caught in rotating parts, e.g. fan.
- First connect both positive poles of the batteries with one jump starting cable (red).
- Use the battery positive terminal in the engine compartment for vehicles with the battery in the luggage compartment.
- Then use the second jump starting cable (black) to connect the negative post of the current-supplying battery with the earth/ground point (not the negative pole or the body) of the vehicle to be started.

Important!

Do not connect the second jump starting cable (black) with the negative pole of the battery in the vehicle to be started. Produced gas could be ignited by sparks.

Risk of explosion!

After the engine of the vehicle to be started has fired, first disconnect the jump starting cable between the negative pole and the earth/ground point. Then remove the starting cable from the positive poles.



61 00 ... **Repairing airbag cables**

Important!

Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations for handling components of airbag system.

Instructions for disconnecting and connecting battery.

In event of non-visible damage to wiring harness:

Disconnect plug connection on airbag module or on adapter plug. It is absolutely vital to disconnect the contacts in succession as there is a risk of mixing up (similar parts)! Cut through one cable after the other at an appropriate position, do not under any circumstances cut through both cables at the same time. Insulate cables remaining in wiring harness with insulating tape. Now disconnect plug connection on airbag control unit. Unpin contacts. Cut through one cable after the other at an appropriate position and insulate with insulating tape, do not under any circumstances cut through both cables at the same time. Pin contacts of repair cable for airbag control unit in control unit plug, assignment of repair cables is relevant. Lay repair cable in vehicle parallel to existing airbag lead. Now pin in contacts for airbag control unit or contacts of adapter plug, assignment of repair cables is relevant. Cut off excess length of repair cable in proximity (visible area) of airbag module or of adapter plug. Twist open cables. With the butt connectors and heat-shrink tubings in the Electronic Parts Catalogue (EPC), reconnect the cables with the same cable colours. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (heat-shrink tubing) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

Cutting off and insulating cables.

Repairing a plug connection using butt connectors.

Installing and removing contacts.

In event of visible damage:

Expose cable at damaged areas. Cut through one cable after the other at an appropriate position and insulate cables no longer required in wiring harness with insulating tape, do not under any circumstances cut through both cables at the same time. Now, depending on the scope of work, unpin contacts either on airbag control unit/airbag module or on adapter plug. Cut off unpinned cables. Insulate cables remaining in wiring harness with insulating tape. Now pin in contacts of repair cable, assignment of repair cables is relevant. Lay repair cable in vehicle parallel to existing airbag lead up to separation point. Cut off excess length of repair cable. Twist open cables. Connect cables with butt connectors and heat-shrink tubings in Electronic Parts Catalogue (EPC), assignment of repair cables is relevant. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (heat-shrink tubing) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

Cutting off and insulating cables.

Repairing a plug connection using connectors.

Installing and removing contacts.



61 00 ... Safety information on handling hybrid cars

1. Qualification:

All repair work on high-voltage components may **only be performed by specially trained personnel** (qualification: Work on high-voltage inherently safe vehicles) must be performed by qualified technicians. Each hybrid car requires additional vehicle specific training with training achievement controls.

Required training is offered by the BMW Training Academy.

2. Identification:

Observe **warning notices** on high-voltage components. When replacing individual high-voltage components, check if warning stickers are present. Independently attaching warnings is only allowed on the locations provided for them. Use only approved and appropriately identified original new parts.

3. Rules of conduct/protective measures:

- Note operating instructions for handling high-voltage battery units.
- Do not under any circumstances touch open high-voltage cables and high-voltage components on damaged vehicle before shutting down the high-voltage electrical system.
- In the event of damage (mechanical, thermal) transition metal oxides, carbon, electrolyte solvents and their products of decomposition may be released.
Suitable acid-resistant protective clothing/equipment must therefore be used when handling the vehicle!

- Hand protection: Gloves
- Eye protection: Safety goggles

Damaged high-voltage battery units must be stored in an acid-resistant pan in a location in the open that is protected against the weather (sun, rain) and secured against unauthorised access. Do not inhale escaping gasses.

- Prevent escaping substances from entering drains, pits and the sewer system.
- Collect any material that is discharged and have it disposed of according to the work instruction, wear acid-resistant protective clothing when doing so.
- Notify the fire brigade if fire breaks out, clear the area immediately and make accident scene safe. Attempt to extinguish the fire without putting persons in danger (suitable extinguishant: water and water foam).
- A cut 2nd emergency separation point must be repaired with a butt connector.

4. Measures before starting work:

- Each job on the vehicle must be assigned by appropriately trained personnel. Before work is started, this electrician must place the vehicle in the operating condition required to perform the relevant activity. The qualified personnel's instructions and directions absolutely must be followed. **No work may be carried out without this qualified personnel being consulted first.**
- It is **not** permitted to work on the high voltage system or on high voltage components while the engine is running.
- The readiness to drive must be ended before shutting off the voltage of the high-voltage system. The readiness to drive is ended when the driver is absent only under the following conditions:
 1. seat belt buckle unlocked **and**
 2. the driver's door is open **and**
 3. no brake activated **and**
 4. the accelerator pedal is not activated **and**
 5. speed < 3 km/h (2 mph)
- Work on live high-voltage components is expressly prohibited. Before each operation on the high-voltage system, the system must be isolated from the power supply by qualified personnel (high-voltage safety connector Off) and secured against unauthorised recommissioning (padlock).
- After each deactivation of the high-voltage system, it is essential to observe a **waiting period** of at least **10 seconds** prior to further work.
- Before beginning work, it is mandatory to check that the equipment is de-energised and is protected against being energised again.
Work is only permitted to begin if:
 1. Corresponding display in the KOMBI **High-voltage system deactivated** orWhen a high-voltage warning is active (indicator light, Check Control, etc.), it is essential to determine and eliminate the cause of this warning via the diagnosis system before continuing with any other work.
If it cannot be definitively established that the equipment is de-energised, work is not permitted to begin. **Danger to life!** Before work begins, a qualified electrician (1000 V AC) must verify that the



system is de-energised using appropriate measuring devices and procedures.

=> In this case, Technical Support must be contacted!

- Do not perform any work on the vehicle while it is charging. Before starting work, disconnect the charging cable from the vehicle.
Battery charging may result in heating of the high-voltage battery unit. This heating may lead to sporadic launches of the electric fan (switch-on request from the electric fan). Therefore, work in the vicinity of the electric fan during the charging procedure is prohibited. Ensure freedom of movement of the battery charge lines in the vicinity of the electric fan.

5. *Measures during/after activities:*

- Identifiable mechanical damage to or tampering with high-voltage components must be reported immediately to the qualified personnel in charge.
- When carrying out any work on the high-voltage system, it is prohibited to drive externally all the drivetrain components (wheels, gearbox, drive shafts, etc.).
- *E72 only:* When the "Power Electronic Box Cover" is removed, the high-voltage system is not permitted to be activated. The high-voltage service disconnect must only be used when the "Power Electronics Box Cover" is completely installed.
- High-voltage cables (orange coating) and their connectors and stop parts **may not** be repaired. If damaged, a cable must always be replaced completely.
- When working in the vicinity of high-voltage components (identified accordingly with warning stickers and orange-coloured coating), protect these components against damage.
- The specified work steps in the repair instructions must be adhered to exactly.
- High-voltage components and their holders must be screwed/bolted to the defined tightening torque. Tightening torques and tightening specifications must be observed.
- Connecting high-voltage components to body ground is crucial to safety for reasons of equipotential bonding. For this reason, it is prohibited to operate any high-voltage components without them being correctly connected to body ground. The measurements (insulation/potential equalisation measurement) are performed automatically by the vehicle. Manual measurement is not therefore necessary.
For a correct earthing connection, the retaining elements of high-voltage components must not be painted. Follow further painting notes.
- Removed high-voltage battery units must be stored in a manner that protects them from misuse and damage.
- Damaged or warning stickers that are no longer legible on high-voltage components must always be replaced.

6. *Potential compensation:*

Equipotential bonding lines, high-voltage cables and the battery negative lead to the EME are fitted with safety screws.

- Clean contact faces and have then checked by a second person.
- Tighten down screws/bolts to specified torque.
- Have tightening torque checked by a second person.
- Both persons must document that the work has been carried out correctly in the vehicle records.



61 00 ... **Safety instructions for handling vehicle battery**

Do not allow any battery acid to come into contact with the eyes, the skin or clothing. Therefore wear protective clothing, gloves and eye protection.

Do not tilt the battery, acid may emerge from the vent hole.

If acid is splashed into the eyes, rinse them immediately for several minutes with clear water. You must then consult a doctor without delay.

If acid is splashed onto the skin or clothing, neutralise it immediately with a soap solution and rinse with lots of water.

Seek medical attention immediately if battery acid is accidentally swallowed.

Strictly no flames, sparks, naked light or smoking!

A highly explosive detonating gas is created when batteries are charged. The rooms where charging is carried out must therefore always be well ventilated.

Avoid the formation of sparks when handling cables, wiring and electrical devices.

Turn the ignition lock to the 0 position before disconnecting or connecting the battery.

Do not place tools or any similar object on the battery (danger of short circuit and explosion hazard!).



61 20 ... Threshold values for battery assessment of all batteries (except telephone batteries)

Safety instructions for handling vehicle battery.

Test step 1 - before battery charge

State of charge 1)	Start output 2)	Test result
cannot be tested		Charge
less than 50 % 2)		Charge
greater than 50 %	less than 75%	Charge
greater than 50 %	greater than 75 % 3)	Charge
greater than 80 %	greater than 75 %	OK

Test step 2 - after battery charge

State of charge 1)	Start output 2)	Test result
cannot be tested		Faulty
less than 50%	less than 75%	Charge
greater than 50 %	greater than 75 %	Charge

1) State of charge and start output must always be evaluated in combination

2) Test charging for more than 5 hours with Gossen CG 32 or Siemens / Gossen VB 801 charger

3) Fully charge until the state of charge is greater than 80%.

Note:

If the battery has been tested from the positive terminal in the engine compartment, repeat the test for safety directly on the battery.





Necessary preliminary tasks:

To access the battery earth lead, perform the necessary preliminary work described in the document Disconnecting battery earth lead.

Do not disconnect the battery earth lead!



Note:

If several 12 V batteries are installed in the vehicle:

Closed-circuit current check is possible **on the vehicle battery only**.



Connect diagnosis system.

Connect the clip-on probe to the battery earth lead of the vehicle battery. The arrow on the clip-on probe must point towards the vehicle battery.

Measure closed-circuit current.



61 00 ... Battery charging calendar

Battery charging calendar 2016 (PDF file)

Battery charging calendar 2017 (PDF file)

Battery charging calendar 2018 (PDF file)

Battery charging calendar 2019 (PDF file)

Information for the battery charging calendar



61 00 ... **Battery log form**

Battery log form 2016

Battery log form 2017

Battery log form 2018

Battery log form 2019



**Important!**

Observe safety informations for handling vehicle battery.



There are two ways to carry out a voltage interruption of the 12-V battery:

1. Manually by disconnecting the battery earth lead
2. With the diagnosis system

1. Manually: Carry out the following steps:

- Switch off and disconnect battery charger
- Turn off ignition.
For vehicles with ignition key: Ignition key in neutral position
Vehicles with ID transmitter: Remove ID transmitter from slot
For vehicles with Comfort Access: Secure terminal 30
- Disconnect negative battery lead
- Reconnect battery earth lead (to ensure bus activity)
- Observe a waiting period of 5–10 s
- Disconnect negative battery lead
- Observe a waiting period of approx. 1 minute
- Connect battery earth lead
Tightening torque: 61 21 1AZ
- Connect and switch on battery charger
- Switch on ignition.

2. With the diagnosis system:

- 03 Body
- Voltage supply
- Activate rest state
- Power-down command



**Warning!**

Read and comply with safety informations pertaining to vehicle battery.

**Attention!**

Lead-acid battery, AGM battery:

To prevent the intelligent battery sensor from malfunctioning, use the charging points in the engine compartment.

Observe instructions on intelligent battery sensor/battery electronics.

**Note:**

Use BMW-recommended charging computers* to charge the battery.

*Sourcing reference BMW Workshop Equipment Catalogue

**Pay attention when charging the lithium ion battery!**

The charging voltage generated by existing chargers designed for the lead-acid or AGM batteries is **too high** for the lithium-ion battery.

In the event of excessive charging voltage, the Li-ion battery isolating switch can open, generating among things a ccm message in the cluster.

Before charging a lithium ion battery, adjust the charging voltage of existing charger adapters once.

Follow notes on lithium ion battery.

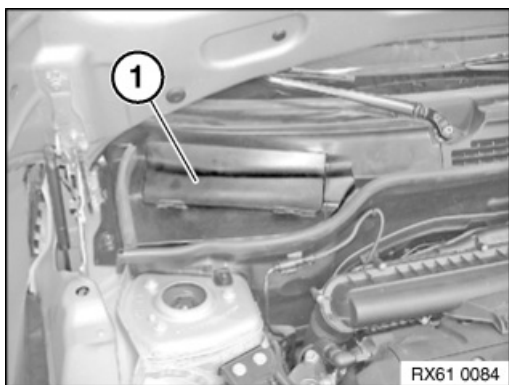


**Warning!**

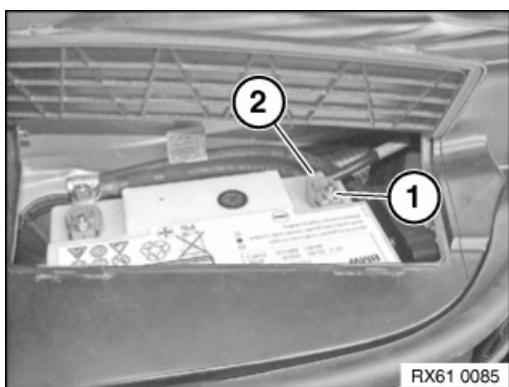
Follow safety regulations for handling vehicle battery.

Follow instructions for disconnecting and connecting battery.

Follow instructions on intelligent battery sensor (IBS).



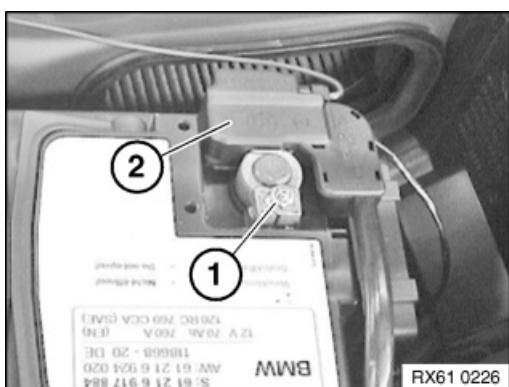
Open cover (1).

Version without intelligent battery sensor (IBS):

Loosen nut (1).

Tightening torque 61 21 1AZ.

Disconnect battery earth lead (2) and secure at side.

Version with intelligent battery sensor (IBS)::

Loosen nut (1).

Tightening torque 61 21 1AZ.

Disconnect battery earth lead (2) and secure at side.



**Warning!**

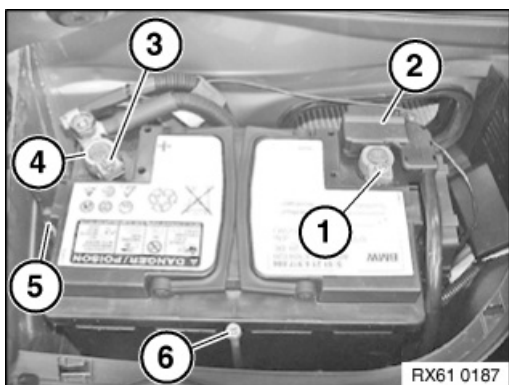
Follow safety regulations for handling vehicle battery.
Follow notes for disconnecting and connecting battery!
Follow instructions on intelligent battery sensor (IBS).



To ensure the correct safety and convenience functions, install only the original battery (battery size and type) stored in the vehicle order.
Observe note on battery replacement.

**Necessary preliminary work:**

- Remove right cowl panel cover



Loosen nut (1). Tightening torque 61 21 1AZ.

Disconnect battery earth lead (2) and secure at side.

Loosen nut (3). Tightening torque 61 21 1AZ.

Remove positive battery cable (4).

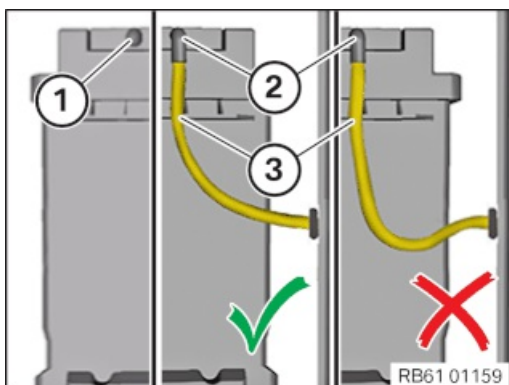
Pull the vent hose (5) off.

Release screw (6) and remove with holder. Tightening torque 61 21 2AZ.

Lift out battery.

Installation note:

- Make sure battery is correctly seated in associated fixture.

**Caution!**

Danger due to released gases!

Installation note:

The battery has two vent holes:

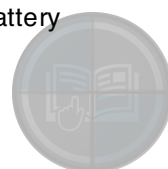
- One vent hole (1) must be closed correctly with a dummy plug.
- The vent hose (3) must be connected correctly at the other vent hole (2).

Always install the vent hose (3) with a downhill gradient to the outside!

No siphon formation!

**Replacement:**

- Read out fault memory, delete if necessary
- On vehicles with IBS (intelligent battery sensor) register battery replacement



61 00 ... Safety information on handling hybrid cars

1. Qualification:

All repair work on high-voltage components may **only be performed by specially trained personnel** (qualification: Work on high-voltage inherently safe vehicles) must be performed by qualified technicians. Each hybrid car requires additional vehicle specific training with training achievement controls.

Required training is offered by the BMW Training Academy.

2. Identification:

Observe **warning notices** on high-voltage components. When replacing individual high-voltage components, check if warning stickers are present. Independently attaching warnings is only allowed on the locations provided for them. Use only approved and appropriately identified original new parts.

3. Rules of conduct/protective measures:

- Note operating instructions for handling high-voltage battery units.
- Do not under any circumstances touch open high-voltage cables and high-voltage components on damaged vehicle before shutting down the high-voltage electrical system.
- In the event of damage (mechanical, thermal) transition metal oxides, carbon, electrolyte solvents and their products of decomposition may be released.
Suitable acid-resistant protective clothing/equipment must therefore be used when handling the vehicle!

- Hand protection: Gloves
- Eye protection: Safety goggles

Damaged high-voltage battery units must be stored in an acid-resistant pan in a location in the open that is protected against the weather (sun, rain) and secured against unauthorised access. Do not inhale escaping gasses.

- Prevent escaping substances from entering drains, pits and the sewer system.
- Collect any material that is discharged and have it disposed of according to the work instruction, wear acid-resistant protective clothing when doing so.
- Notify the fire brigade if fire breaks out, clear the area immediately and make accident scene safe. Attempt to extinguish the fire without putting persons in danger (suitable extinguishant: water and water foam).
- A cut 2nd emergency separation point must be repaired with a butt connector.

4. Measures before starting work:

- Each job on the vehicle must be assigned by appropriately trained personnel. Before work is started, this electrician must place the vehicle in the operating condition required to perform the relevant activity. The qualified personnel's instructions and directions absolutely must be followed. **No work may be carried out without this qualified personnel being consulted first.**
- It is **not** permitted to work on the high voltage system or on high voltage components while the engine is running.
- The readiness to drive must be ended before shutting off the voltage of the high-voltage system. The readiness to drive is ended when the driver is absent only under the following conditions:
 1. seat belt buckle unlocked **and**
 2. the driver's door is open **and**
 3. no brake activated **and**
 4. the accelerator pedal is not activated **and**
 5. speed < 3 km/h (2 mph)
- Work on live high-voltage components is expressly prohibited. Before each operation on the high-voltage system, the system must be isolated from the power supply by qualified personnel (high-voltage safety connector Off) and secured against unauthorised recommissioning (padlock).
- After each deactivation of the high-voltage system, it is essential to observe a **waiting period** of at least **10 seconds** prior to further work.
- Before beginning work, it is mandatory to check that the equipment is de-energised and is protected against being energised again.
Work is only permitted to begin if:
 1. Corresponding display in the KOMBI **High-voltage system deactivated** orWhen a high-voltage warning is active (indicator light, Check Control, etc.), it is essential to determine and eliminate the cause of this warning via the diagnosis system before continuing with any other work.
If it cannot be definitively established that the equipment is de-energised, work is not permitted to begin. **Danger to life!** Before work begins, a qualified electrician (1000 V AC) must verify that the



system is de-energised using appropriate measuring devices and procedures.

=> In this case, Technical Support must be contacted!

- Do not perform any work on the vehicle while it is charging. Before starting work, disconnect the charging cable from the vehicle.
Battery charging may result in heating of the high-voltage battery unit. This heating may lead to sporadic launches of the electric fan (switch-on request from the electric fan). Therefore, work in the vicinity of the electric fan during the charging procedure is prohibited. Ensure freedom of movement of the battery charge lines in the vicinity of the electric fan.

5. *Measures during/after activities:*

- Identifiable mechanical damage to or tampering with high-voltage components must be reported immediately to the qualified personnel in charge.
- When carrying out any work on the high-voltage system, it is prohibited to drive externally all the drivetrain components (wheels, gearbox, drive shafts, etc.).
- *E72 only:* When the "Power Electronic Box Cover" is removed, the high-voltage system is not permitted to be activated. The high-voltage service disconnect must only be used when the "Power Electronics Box Cover" is completely installed.
- High-voltage cables (orange coating) and their connectors and stop parts **may not** be repaired. If damaged, a cable must always be replaced completely.
- When working in the vicinity of high-voltage components (identified accordingly with warning stickers and orange-coloured coating), protect these components against damage.
- The specified work steps in the repair instructions must be adhered to exactly.
- High-voltage components and their holders must be screwed/bolted to the defined tightening torque. Tightening torques and tightening specifications must be observed.
- Connecting high-voltage components to body ground is crucial to safety for reasons of equipotential bonding. For this reason, it is prohibited to operate any high-voltage components without them being correctly connected to body ground. The measurements (insulation/potential equalisation measurement) are performed automatically by the vehicle. Manual measurement is not therefore necessary.
For a correct earthing connection, the retaining elements of high-voltage components must not be painted. Follow further painting notes.
- Removed high-voltage battery units must be stored in a manner that protects them from misuse and damage.
- Damaged or warning stickers that are no longer legible on high-voltage components must always be replaced.

6. *Potential compensation:*

Equipotential bonding lines, high-voltage cables and the battery negative lead to the EME are fitted with safety screws.

- Clean contact faces and have then checked by a second person.
- Tighten down screws/bolts to specified torque.
- Have tightening torque checked by a second person.
- Both persons must document that the work has been carried out correctly in the vehicle records.



61 25 ... Assessing the transport capability of cell block in service workshops



Warning!

High-voltage system - danger to life!

The following points must be strictly observed **prior to starting work**:

- Safety information for handling electric / hybrid vehicles.
- Visual check of the high-voltage battery unit following an accident

Initiating:

For analysis and disposal purposes, it is necessary to transport an already used cell module. These lithium-ion based cell blocks are to be classified as hazardous material according to UN 38.3, and may only be transported under particular prerequisites.

Obtaining the certified transportability between the assessment and delivery of the cell block to the disposal / transportation company is the responsibility of a qualified person. For shipping one also needs to take into account the influence of the storage requirements and other possible occurring events for the determined transportability.

The transport in the sense of the hazardous goods legislation is organised in three areas:

1. Assessment of the transportability
2. Transport preparation
3. Performing the transport

This document contains all the necessary information in order to assess the transportability of a used cell block. The transport preparation and execution is **not** an element of this document.

Further information on this can be found in the information bulletin in the ASAP.

It will be explained which measures are necessary in order to assess the transportability.

How these measures are to be performed individually depends on the particular situation at the location and is not an element of this document. These procedures are to be defined according to the local regulations / laws and recorded as valid local work instructions.

Prerequisites from a security perspective:

The analysis and assessment of the cell block is to be performed by an "expert for working on HV intrinsically safe vehicles".

The certificate of the transportability is the responsibility of the qualified person.

The following specifications for work safety must also be observed:

Storage of cell blocks

For dual-cell modules, the module connector should be disconnected.

The information for this can be found in the information bulletin in the ASAP.



Note:

This document must be printed out and archived with the vehicle data.



Assessment cell block

NAME	Date	Serial no.	VIN

Signature:

The electrical assessment of the cell module takes place via the **diagnosis and test module**.

The de-energised state of the high-voltage battery unit is to be determined **before** it is removed from the vehicle.

De-energise the high-voltage system.

Transport preventing faults according to the diagnosis or the test module	Yes	No
---	-----	----

Visual assessment:

Smoke	Yes	No
Evidence of fire damage	Yes	No
Heat development	Yes	No
Crack or opening on the housing	Yes	No
Dents on the housing, deformation, damage	Yes	No
Loose connections, loose or damaged	Yes	No
Serial number not readable	Yes	No
Suspected water damage	Yes	No

Cell module, transport capable	No	Yes
--------------------------------	----	-----

The serial number must be clearly legible. If the serial number can no longer be read, the housing of the cell block must be clearly marked with the serial number.

The electrical and visual assessment must be set down in writing!

If one or more points is/are answered with yes the following procedure must be clarified with technical support! Furthermore, the high-voltage battery unit that has been removed must be blocked off with high-voltage barrier tape. If the high-voltage battery unit is still in the vehicle, the vehicle must be made inaccessible and blocked off.



61 00 ... Battery charging calendar

Battery charging calendar 2016 (PDF file)

Battery charging calendar 2017 (PDF file)

Battery charging calendar 2018 (PDF file)

Battery charging calendar 2019 (PDF file)

Information for the battery charging calendar



61 00 ... **Battery log form**

Battery log form 2016

Battery log form 2017

Battery log form 2018

Battery log form 2019



61 25 ... Notes on repair of high-voltage battery unit

1. Prerequisite

Various organisational prerequisites need to be fulfilled before the repair of a high-voltage battery unit is permitted and can be carried out in an expedient way. These prerequisites concern both, the commercial company and the service employee.

The repair of a high-voltage battery unit is intended to be carried out exclusively by commercial companies featuring the service format BMW i Service Extended Battery or BMW i Service Full.

A commercial company featuring the service format BMW i Service Basic is able to remove and install a high-voltage battery unit but cannot perform any repair work on or in the high-voltage battery unit. If a repair is required according to the test schedule in the diagnosis system, the vehicle or the high-voltage battery unit must be transported to a commercial company featuring the service format BMW i Service Extended Battery or BMW i Service Full. The repair is to be carried out in such a workshop.

The commercial company must make available the required special tools and a suitable workbay for the repair.

The most important special tools are the following:

- Mobile lift table MHT 1200 + set of adapters to remove and install the high-voltage battery unit
- Charger for cell blocks of high-voltage battery unit
- Diagnosis system for the repaired high-voltage battery unit
- Lifting tackle to remove and install cell blocks
- Panel wedges made of plastic to remove clips within the high-voltage battery unit
- Lifting traverse for the complete high-voltage battery unit
- High-voltage barrier tape
- Yellow cones relating to high-voltage recommended

Sourcing reference:

See Aftersales Assistance Portal (ASAP) - Service/Technical - Workshop Equipment (Start BMW) - Shop Workshop Equipment or at www.bmwgroup.com

Only service employees being qualified for the repair of the high-voltage battery unit may carry out this procedure.

This includes training for "experts for work on high-voltage-intrinsically safe vehicles".

Before removing and opening the high-voltage battery unit, troubleshooting is to be carried out by means of the relative diagnosis system. Only if determined by the test schedule and if the prerequisite „no mechanical damage on the outside“ is satisfied, the high-voltage battery unit may be opened and the faulty component identified by the test schedule can be replaced. No other repair work relating to the high-voltage battery unit than the replacement of faulty components is planned.

It is essential to observe the operational steps specified in the repair instructions very precisely in order to carry out the replacement of a faulty component. The use of the special tools listed therein is absolutely essential as well.

2. Safety rules

- The first step after opening the housing cover to repair the high-voltage battery unit is a visual inspection for mechanical damage.
- A thorough visual inspection of the components inside the working area is required during and/or before and after every operation. When removing one component, all other involved components being accessible need to be checked for damages. If the housing or other internal high-voltage components are damaged, a qualified electrician or Technical Support must be contacted. All repair works relating to the high-voltage battery unit must be stopped immediately for safety reasons
- Check the correct latch mechanism of the connector of the insulation monitoring line at the control unit of the high-voltage battery unit. If this is not fully locked, an isolation fault may not have been detected.
- The separation of the high-voltage cable between the two cell modules mounted on the inside of the housing (across from the connection side of the high-voltage battery unit) is to be always carried out before working on the opened high-voltage battery unit. This procedure ensures the interrupt of the series connection (additional safety)
- The workbay required for the repair of the high-voltage battery unit must be clean (free of grease, dirt and



swarf), dry (no leaking fluid) and free of flying sparks. Therefore, avoid close vicinity to areas intended for cleaning of vehicles and to workbays intended for repair work relating to the body. Use movable walls for separation, if needed

- High-voltage barrier tape is required to secure the workbay against unauthorised access (insufficient qualification, customers, visitors, etc.). It is also required in case the high-voltage intrinsic safety is not established or the status is not determined yet. Placing yellow cones with lightning bolt to indicate high-voltage when leaving the working area is recommended
- Do not use tools or other objects with pointed and sharp blades/edges when working on high-voltage components or high-voltage cables and/or in their close vicinity. Diagonal cutting pliers, knives etc. are prohibited. Cable straps inside the low-voltage wiring harness may be opened by means of diagonal cutting pliers

Allowed: Plastic wedges

- Cable straps relating to high-voltage cable may not be cut open. Damaged clips remain on the high-voltage cable. The remaining, damaged clip must be pushed to a position on the high-voltage line where the clip can not rub. A new clip must then be installed
- Defective or damaged high-voltage cables must be made unusable to ensure they are not reused
- No tools must be forgotten inside the high-voltage battery unit. Check whether all tools are present in the tool box before closing the housing cover
- It is absolutely essential to remove all small parts/screws that fell into the high-voltage battery unit. The use of magnetized screws is generally recommended in order not to lose any screws in the high-voltage battery unit during the repair
- When interruptions of work occur: Secure housing cover against unintended opening by screwing in several screws. Enclose the working area by means of high-voltage barrier tape
- Due to the very slim construction of the radiator, the risk of damage during disassembly and installation is high. Careful handling is absolutely necessary as the cooling of the cell blocks may not be guaranteed when the radiator is damaged (bent, dented). The consequence is a major loss of the electrical range and of the power of the vehicle. In extreme cases, even a breakdown may occur
- Very careful handling is necessary when disconnecting and connecting the insulation detector line at the control unit of the high-voltage battery unit (safety box coming) since high-voltage is present in the thin orange lines. Do not pull on the lines (e.g. to unplug the connector etc.)! The connector must be locked securely when plugged in
- Make sure the plastic lids of the modules are not removed when working on the cell modules (loosing screws, raising and lifting, ...). The live cell contacting system is located thereunder. Continuing to work with the lid being removed is not permitted. A qualified electrician or Technical Support must be contacted
- A schematic diagram with limiting sample examples in the training is necessary to get to know the limits. These show when the further work for the "experts for intrinsically safe vehicles" is no longer possible due to absent intrinsic safety, and the Technical Support or a qualified electrician must be contacted
- Remove residual moisture and coarse contamination around the lid of the high-voltage battery unit before beginning the disassembly
- Clean gaskets and sealing surfaces (venting unit, high-voltage connector, signal connector, radiator connection) with a specified cleaning agent before reassembly
- If contamination is present in the high-voltage battery unit, check the cause and carefully clean the affected areas

Approved cleaning agent:

- Spirit
 - Windscreen cleaner
 - Glass cleaner
 - Distilled water
 - Vacuum cleaner with plastic top
- Visual inspection for contamination and damage of housing as well as of connections and degassing unit when installed (underfloor). A damaged diaphragm within the venting unit may indicate damaged storage cells. In this case, special carefulness is required when checking and opening the high-voltage battery unit
 - Electrolyte
The majority of the electrolyte is a mixture of lithium-nickel-manganese-cobalt oxide in bound state. The quantity of free electrolyte in the high-voltage battery unit is very small. It is a noxious and irritant fluid. Absolutely avoid direct contact of skin with leaking fluid as acid burns may occur. In case of contact with eyes or skin, flush with plenty of clear water and consult a doctor immediately. Burning or evaporating electrolyte is also hazardous. CAREFUL: do not inhale! Ensure sufficient fresh air supply. If breathing ceases, apply artificial respiration and immediately consult a doctor. Notify fire brigade in case of fire. Clear the area immediately and make accident scene safe. Attempt to extinguish the fire without putting persons in danger and use suitable extinguishant, e.g. water



3. Repairing removed high-voltage battery units

- The high-voltage battery unit is a component of large dimensions and heavy weight. Only the combination of the housing and the cell blocks mounted therein provides the high-voltage battery unit with complete stability (rigidity), as required for driving. Therefore, it is necessary to ensure that the housing is positioned on the relative mounting/adaptor of the lifting table during replacement and fixation of cell blocks. In this way, one can prevent the housing from bracing during the repair work and ensure the high-voltage battery unit is not installed in the BMW I01 in this condition
- It is extremely important to enter the serial numbers and the installation positions of the replaced components in the SME via the testing device, as well as to carry out the transmission into the diagnosis system. Otherwise, the new installation position will be assigned automatically by the SME. The consequence is an incorrect location data, as the SME does not set correct positions. For a renewed repair of the high-voltage battery unit, the diagnosed faults for the incorrect installation position will be displayed. The consequence is that replacement is done at the wrong location
- In diagnosis, it is not possible to enter the serial numbers of the cell supervision circuits. The serial numbers are transmitted from the cell supervision circuit to the SME using the CAN bus. The SME then sets a corresponding position assignment. This assignment is not always fault-free. That is why the serial number and installation position of the exchanged cell supervision circuit must be checked in the diagnosis after completed repair. If the positions do not match, a position change can be performed with diagnosis. A new serial number of a cell supervision circuit is not entered
- Attention: Do not use powered wrenches as the screws/threads located in the high-voltage battery unit may break due to the low torques!
- The seal must be renewed every time the housing cover is removed to guarantee tightness of the high-voltage battery unit
- The screws are thread-tapping, so pre-insert them manually before tightening them with a tool. Otherwise, the threads of the lower housing section may be damaged!



61 00 ... Safety information on handling hybrid cars

1. Qualification:

All repair work on high-voltage components may **only be performed by specially trained personnel** (qualification: Work on high-voltage inherently safe vehicles) must be performed by qualified technicians. Each hybrid car requires additional vehicle specific training with training achievement controls.

Required training is offered by the BMW Training Academy.

2. Identification:

Observe **warning notices** on high-voltage components. When replacing individual high-voltage components, check if warning stickers are present. Independently attaching warnings is only allowed on the locations provided for them. Use only approved and appropriately identified original new parts.

3. Rules of conduct/protective measures:

- Note operating instructions for handling high-voltage battery units.
- Do not under any circumstances touch open high-voltage cables and high-voltage components on damaged vehicle before shutting down the high-voltage electrical system.
- In the event of damage (mechanical, thermal) transition metal oxides, carbon, electrolyte solvents and their products of decomposition may be released.
Suitable acid-resistant protective clothing/equipment must therefore be used when handling the vehicle!

- Hand protection: Gloves
- Eye protection: Safety goggles

Damaged high-voltage battery units must be stored in an acid-resistant pan in a location in the open that is protected against the weather (sun, rain) and secured against unauthorised access. Do not inhale escaping gasses.

- Prevent escaping substances from entering drains, pits and the sewer system.
- Collect any material that is discharged and have it disposed of according to the work instruction, wear acid-resistant protective clothing when doing so.
- Notify the fire brigade if fire breaks out, clear the area immediately and make accident scene safe. Attempt to extinguish the fire without putting persons in danger (suitable extinguishant: water and water foam).
- A cut 2nd emergency separation point must be repaired with a butt connector.

4. Measures before starting work:

- Each job on the vehicle must be assigned by appropriately trained personnel. Before work is started, this electrician must place the vehicle in the operating condition required to perform the relevant activity. The qualified personnel's instructions and directions absolutely must be followed. **No work may be carried out without this qualified personnel being consulted first.**
- It is **not** permitted to work on the high voltage system or on high voltage components while the engine is running.
- The readiness to drive must be ended before shutting off the voltage of the high-voltage system. The readiness to drive is ended when the driver is absent only under the following conditions:
 1. seat belt buckle unlocked **and**
 2. the driver's door is open **and**
 3. no brake activated **and**
 4. the accelerator pedal is not activated **and**
 5. speed < 3 km/h (2 mph)
- Work on live high-voltage components is expressly prohibited. Before each operation on the high-voltage system, the system must be isolated from the power supply by qualified personnel (high-voltage safety connector Off) and secured against unauthorised recommissioning (padlock).
- After each deactivation of the high-voltage system, it is essential to observe a **waiting period** of at least **10 seconds** prior to further work.
- Before beginning work, it is mandatory to check that the equipment is de-energised and is protected against being energised again.
Work is only permitted to begin if:
 1. Corresponding display in the KOMBI **High-voltage system deactivated** orWhen a high-voltage warning is active (indicator light, Check Control, etc.), it is essential to determine and eliminate the cause of this warning via the diagnosis system before continuing with any other work.
If it cannot be definitively established that the equipment is de-energised, work is not permitted to begin. **Danger to life!** Before work begins, a qualified electrician (1000 V AC) must verify that the



system is de-energised using appropriate measuring devices and procedures.

=> In this case, Technical Support must be contacted!

- Do not perform any work on the vehicle while it is charging. Before starting work, disconnect the charging cable from the vehicle.
Battery charging may result in heating of the high-voltage battery unit. This heating may lead to sporadic launches of the electric fan (switch-on request from the electric fan). Therefore, work in the vicinity of the electric fan during the charging procedure is prohibited. Ensure freedom of movement of the battery charge lines in the vicinity of the electric fan.

5. *Measures during/after activities:*

- Identifiable mechanical damage to or tampering with high-voltage components must be reported immediately to the qualified personnel in charge.
- When carrying out any work on the high-voltage system, it is prohibited to drive externally all the drivetrain components (wheels, gearbox, drive shafts, etc.).
- *E72 only:* When the "Power Electronic Box Cover" is removed, the high-voltage system is not permitted to be activated. The high-voltage service disconnect must only be used when the "Power Electronics Box Cover" is completely installed.
- High-voltage cables (orange coating) and their connectors and stop parts **may not** be repaired. If damaged, a cable must always be replaced completely.
- When working in the vicinity of high-voltage components (identified accordingly with warning stickers and orange-coloured coating), protect these components against damage.
- The specified work steps in the repair instructions must be adhered to exactly.
- High-voltage components and their holders must be screwed/bolted to the defined tightening torque. Tightening torques and tightening specifications must be observed.
- Connecting high-voltage components to body ground is crucial to safety for reasons of equipotential bonding. For this reason, it is prohibited to operate any high-voltage components without them being correctly connected to body ground. The measurements (insulation/potential equalisation measurement) are performed automatically by the vehicle. Manual measurement is not therefore necessary.
For a correct earthing connection, the retaining elements of high-voltage components must not be painted. Follow further painting notes.
- Removed high-voltage battery units must be stored in a manner that protects them from misuse and damage.
- Damaged or warning stickers that are no longer legible on high-voltage components must always be replaced.

6. *Potential compensation:*

Equipotential bonding lines, high-voltage cables and the battery negative lead to the EME are fitted with safety screws.

- Clean contact faces and have then checked by a second person.
- Tighten down screws/bolts to specified torque.
- Have tightening torque checked by a second person.
- Both persons must document that the work has been carried out correctly in the vehicle records.



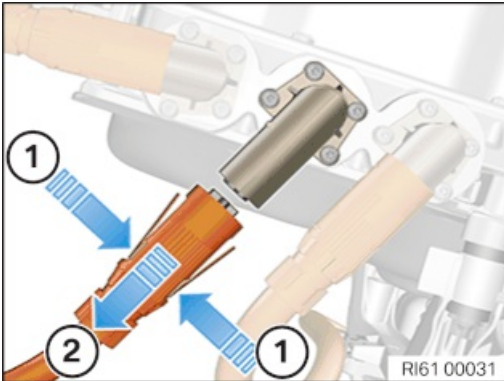
61 13 ... Unlocking and disconnecting various plug connections in electrical and hybrid vehicles



Attention!

Observe the following instructions for handling high-voltage plug connections:

- Damaged high-voltage plug connections must be replaced completely. Repair is not permitted.
- Dirt contamination must be removed before opening the plug connection.



Disconnect the Hirschmann high-voltage connector:

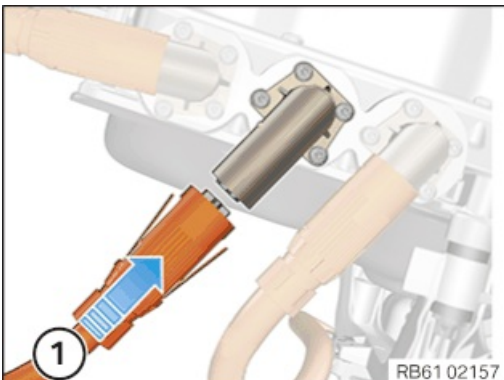
Press the lock (1) on the left and right on the connector in the direction of the arrow.

Pull off connector (2) in direction of arrow.

Attention!

Connector (2) is difficult to pull off.

In the event of damage to high-voltage connector (2), the complete high-voltage cable must be replaced!

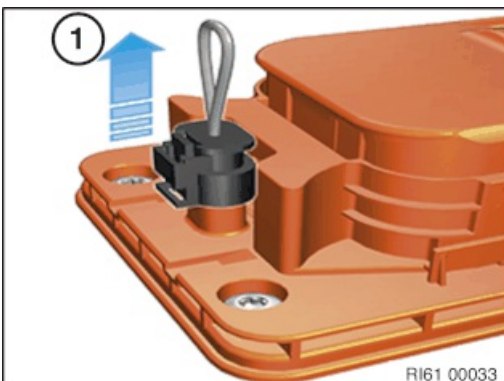


Connect the Hirschmann high-voltage connectors:

Slide the connector (1) on in the direction of the arrow.

Note:

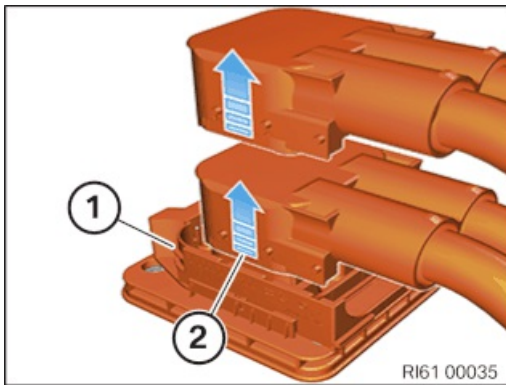
Connector (2) must lock audibly.



Disconnect the Kostal high-voltage connector:

Unlock and disconnect high-voltage interlock loop (1).





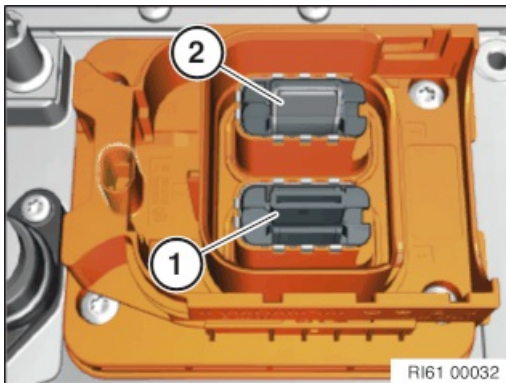
Push the lock (1) fully to the front.

Lift the connector (2) and remove it entirely.

Attention!

Plug connection (3) is difficult to pull off.

The connector (2) must be completely pulled off the opposite housing in one step. Damage may be caused to contact protection if connector is only partly pulled off and then closed again!



Check the Kostal high-voltage connector and connection for damage:

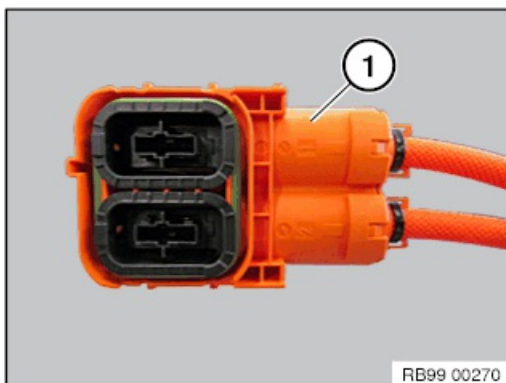
Check the touch protection for damage and correct positioning (1).

Warning!

Do not touch unprotected connector (2)!

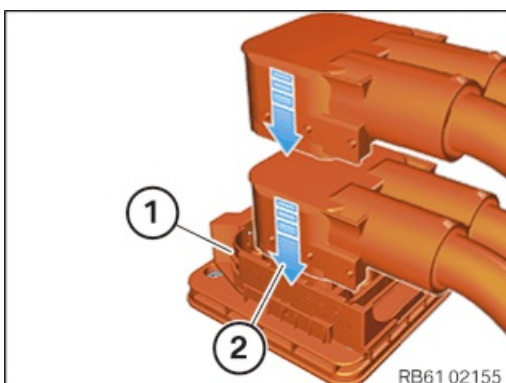
If the contact protection (1) has been pushed to the bottom (2), the high-voltage connector must be refitted.

If contact protection (1) remains in bottom position (2) after reinstallation, the contact protection is faulty and the component must be replaced!



Check the high-voltage connector (1) for damage. **Warning!**

In the event of damage to the high-voltage connector (1), the complete high-voltage cable must be replaced!



Connect the Kostal high-voltage connector:

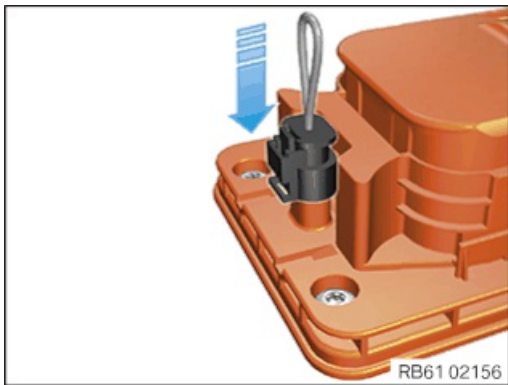
Connect the connector (2) in one single movement to the counter-housing.

Push the lock (1) fully to the rear.

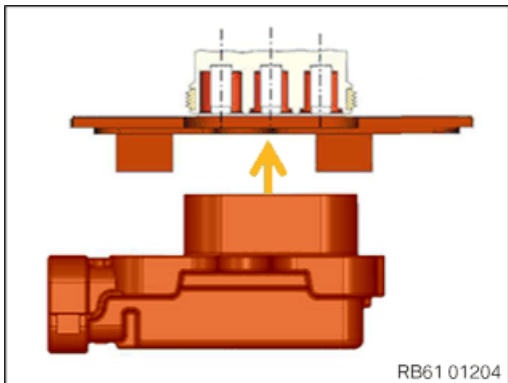
Attention!

Plug connection (3) must be correctly locked by lock (2), otherwise there is a risk of damage.



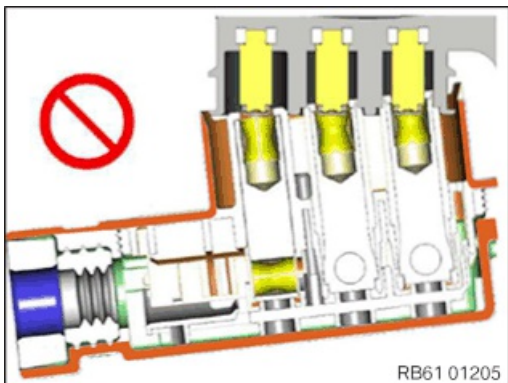


Connect the connector for the high-voltage interlock.



Three-phase high-voltage connector:

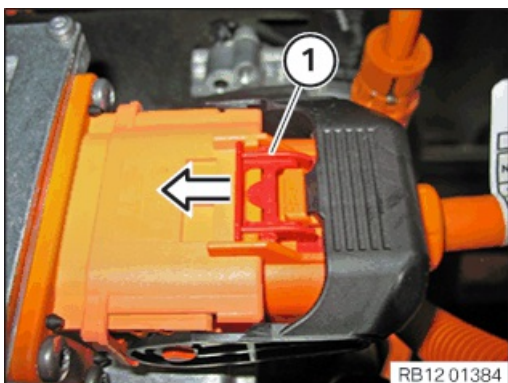
Connect and disconnect the connector straight.



Attention!

The system is designed to only offer limited protection against damage caused by connectors that are inserted at an angle.

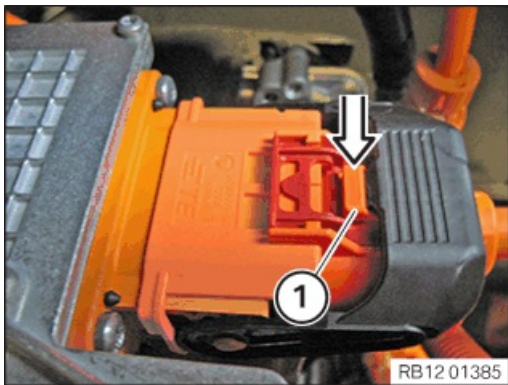
Increased tilted connections will increase the connecting force and the risk of danger.



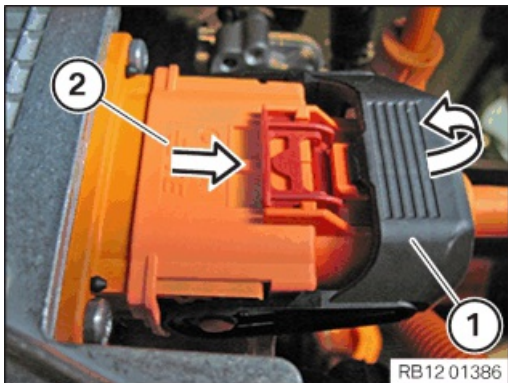
Disconnect the high-voltage connector from the high-voltage connection of the KLE:

Slide lock (1) in direction of arrow up to stop.

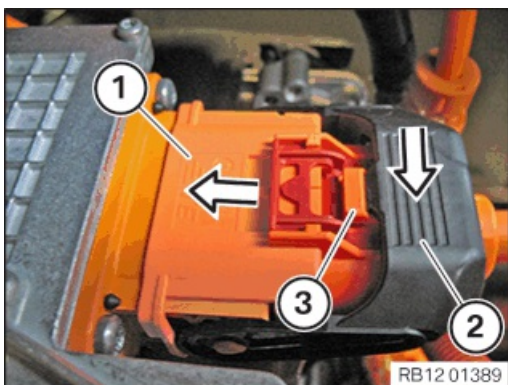




Press lock (1).



Open the lock (1) completely and disconnect the connector (2).



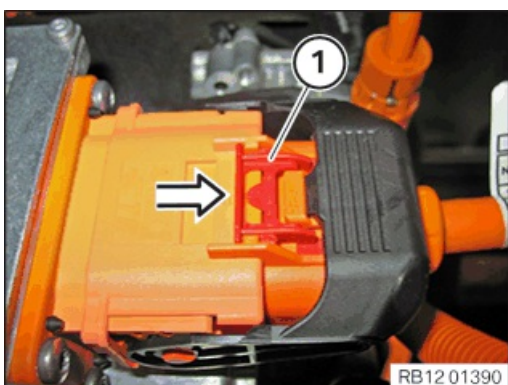
Connect the high-voltage connector to the high-voltage connection of the KLE:

Connect the connector (1) to the limit position and close the lock (2).

Attention!

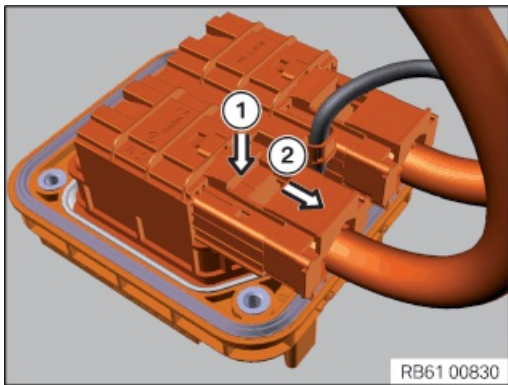
Lock (2) must snap audibly into place.

The retaining lug of the lock (2) must be positioned completely under the lock (2).



Slide the lock (1) on to the stop in the direction of the arrow.





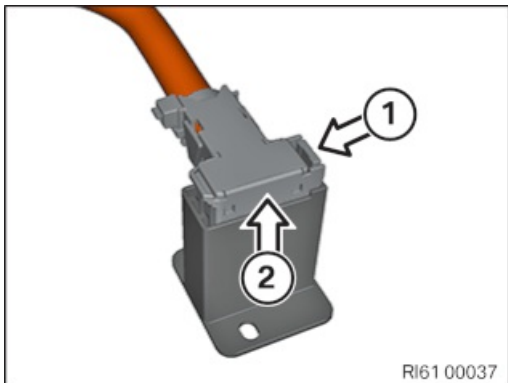
High-voltage connector on the high-voltage connection of the high-voltage battery unit:

Press down unlocking (1) in direction of arrow and pull off connector in direction of arrow (2).

Attention!

Contact protection is no longer provided in the event of a damaged connector housing.

In this case, contact technical support.



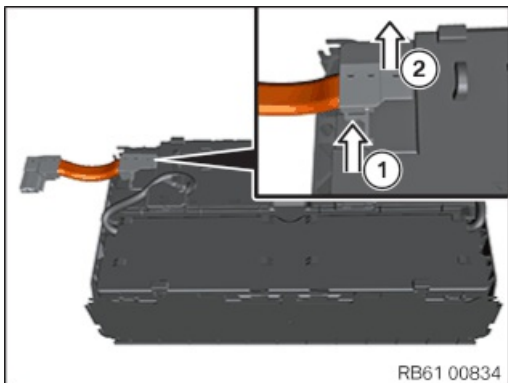
High-voltage connector on the cell module I01:

Press unlocking device (1) together and pull off connector upwards (2).

Attention!

Contact protection is no longer provided in the event of a damaged connector housing.

In this case, contact technical support.



High-voltage connector on the cell module (cell module connecting line):

Press unlocking (1) in direction of arrow and pull off connector in direction of arrow (2).

Attention!

Contact protection is no longer provided in the event of a damaged connector housing.

In this case, contact technical support.



*Note:*

Steering angle sensor adjustment must be carried out:

- after adjustment work on the front axle/steering
- after all mechanical work on the steering system
- after replacement / coding / programming of the following components:
 - Steering column switch cluster
 - Dynamic Stability Control (DSC) control unit



Connect vehicle to BMW diagnosis system.

Select and carry out steering angle sensor adjustment under Service functions.





Note:

Initialisation is necessary:

- after replacing windscreen
- after replacing the rain sensor
- after installing a used rain sensor



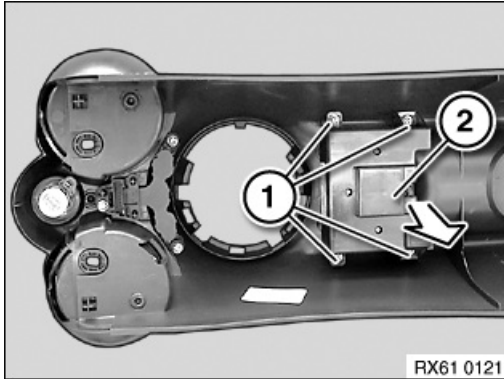
Note:

- Connect BMW diagnosis system
- Initialise rain sensor



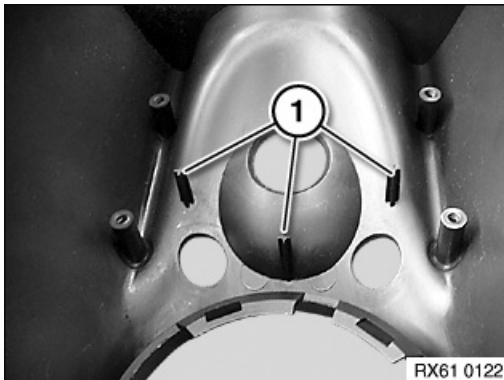
**Necessary preliminary tasks:**

- Remove the storage compartment / cup holder



Release screws (1).

Remove controller (2).

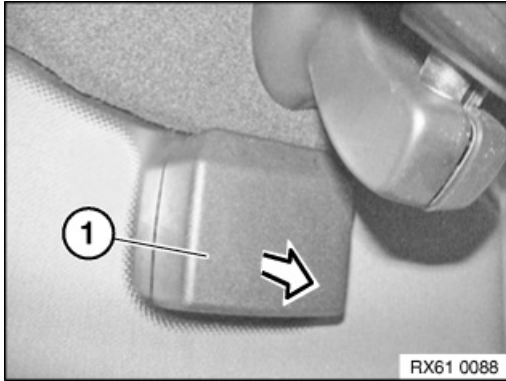
**Installation note:**

Controller must be correctly seated in guide pins (2).

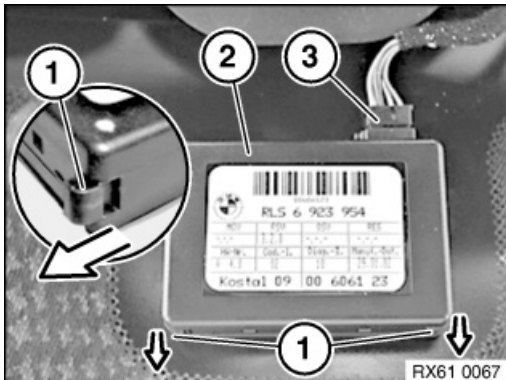


**Important!**

Read and comply with notes on protection against electrostatic discharge (ESD protection).



Unclamp cover (1) in direction of arrow and remove.



Pull out locks (1) in direction of arrow and remove rain/light sensor (2).
Disconnect plug connection (3).

Installation note:

Do not damage optical element covered by rain/light sensor (2).

Replacement:

Encode JBE and initialise rain/light sensor (2).





Warning!

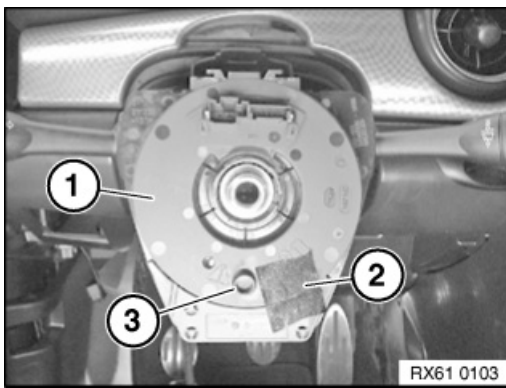
Move wheels into straight-ahead position and do not alter this position during the repair work.

Do not under any circumstances turn the mounting for the steering column switch cluster when the steering wheel is removed.



Necessary preliminary work:

- Remove lower section of steering column shroud

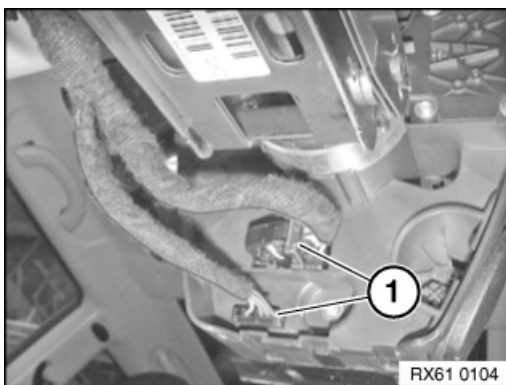


Warning!

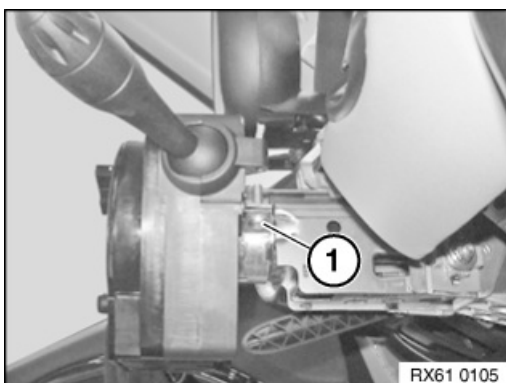
Secure coil spring cassette (1) against rotating with adhesive tape (2).

If unauthorised rotation of coil spring cassette (1) can not be ruled out, it is essential to return coil spring cassette (1) to centre position.

- Turn clock spring counterclockwise to limit position.
- Turn the clock spring clockwise to the limit position, while doing this count the number of rotations
- Turn the clock spring back to centre position (half of the rotations counted before) and secure so that the centring pin (3) is at the bottom position

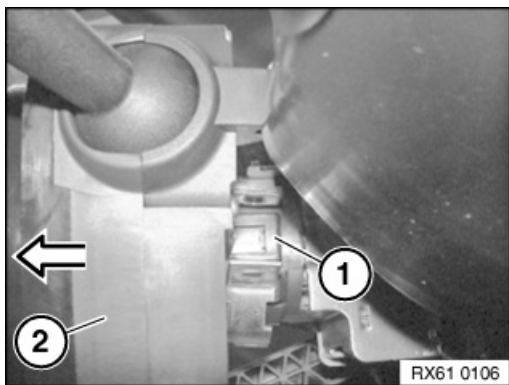


Disconnect plug connection (1).



Release screw (1).



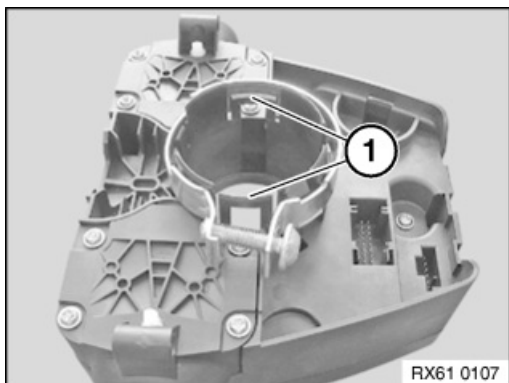


Attention!

Risk of damage!

Unlock the retaining tab (1) and retaining tab on the opposite side to the outside.

Remove steering column switch cluster (2) in direction of arrow.



Installation note:

Retaining tabs (1) must not be damaged



Replacement:

- Carry out vehicle programming/encoding
- Version with Dynamic Stability Control (DSC): perform steering angle sensor adjustment

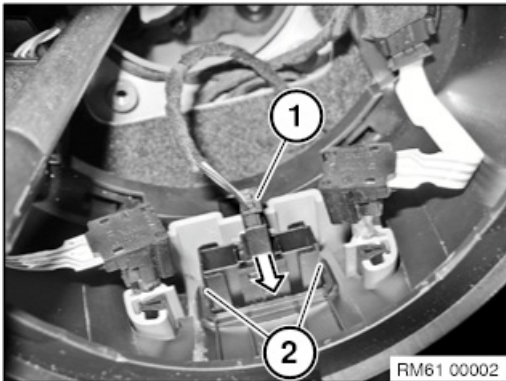


**Necessary preliminary tasks:**

- Remove gearshift lever cover / selector lever cover

With controller version only:

- Remove front cup holder



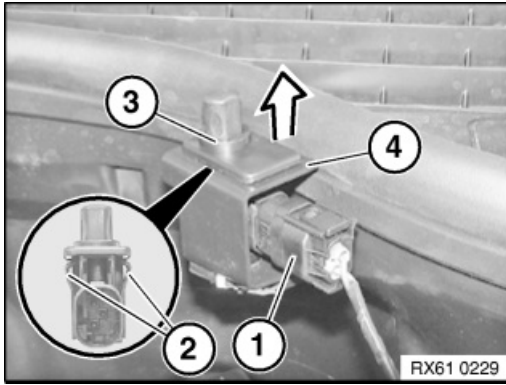
Disconnect plug connection (1).

Unlock connecting socket AV (2) and press in direction of arrow.

Installation note:

Make sure connecting socket AV (2) is seated correctly.



*Note:*

Graphic shows the R56 by way of example, deviations in detail are possible in other models.

Disconnect plug connection (1).

Release latch mechanisms (2) with a suitable tool.

Remove engine compartment lid contact switch (3) from bracket (4) in direction of arrow.

Installation note:

Ensure engine compartment lid contact switch (3) is correctly seated in bracket (4).



61 31 221 Removing and installing/replacing both multifunction steering wheel switches



Operation is described in:

Removing multifunction steering wheel switch

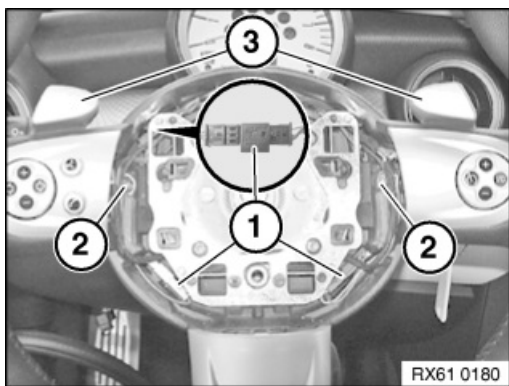


61 31 113 Removing and installing/replacing both shift paddles for automatic transmission



Necessary preliminary tasks:

- Remove airbag unit



Disconnect plug connection (1).

Unfasten screws (2).

Remove shift paddles (3).

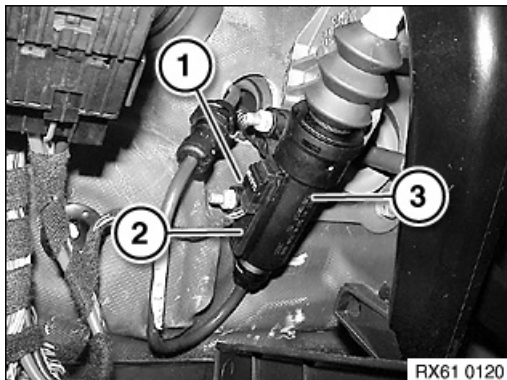
Installation note:

- Ensure shift paddles (3) are correctly seated.
- Make sure electrical wiring is correctly routed.



**Necessary preliminary tasks:**

- Remove instrument panel trim at bottom left



Disconnect plug connection (1).

Lever out clutch switch module (2) from clutch master cylinder (3) with screwdriver.

Installation note:

Clutch switch module is secured against incorrect installation.

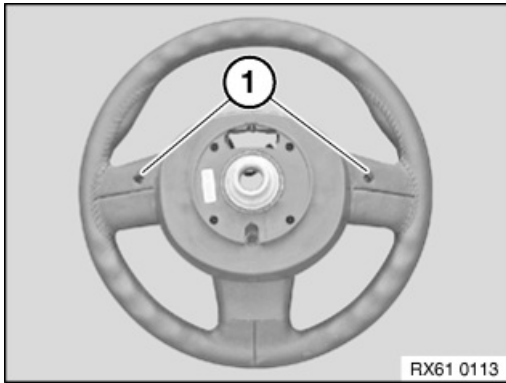
Clutch switch module must snap audibly into place.





Necessary preliminary work:

- If necessary, remove the shift paddles

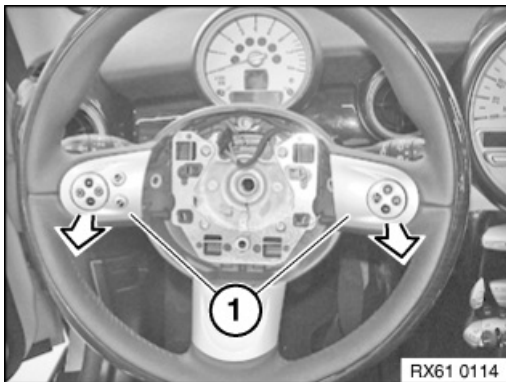


Note:

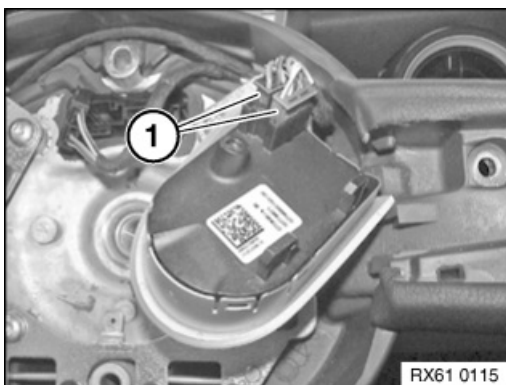
Illustration shows steering wheel removed.

The two multifunction steering wheel switches can be removed separately.

Release screws (1).



Remove switch (1) in direction of arrow.



Note:

Illustrations depict removal of the right multifunction steering wheel switch. The left multifunction steering wheel switch is removed in the same way.

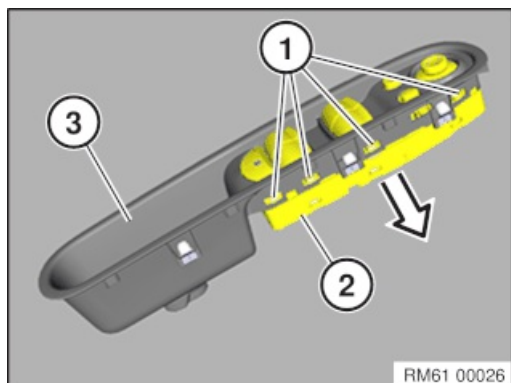
Disconnect plug connections (1) and remove multifunction steering wheel switch.





Necessary preliminary tasks:

- Remove the handle recess on the front door trim panel



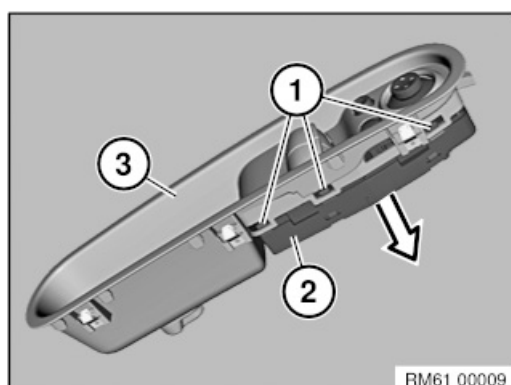
On R60:

Release catches (1) on both sides.

Remove the switch (2) from the handle recess (3) in direction of arrow.

Installation note:

Latch mechanisms (1) must not be damaged or missing.



On R61:

Release catches (1) on both sides.

Remove the switch (2) from the handle recess (3) in direction of arrow.

Installation note:

Latch mechanisms (1) must not be damaged or missing.

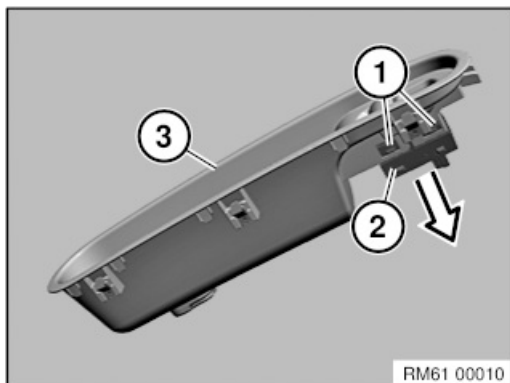


61 31 118 Removing and installing/replacing power window switch of front passenger side



Necessary preliminary tasks:

- Remove the handle recess on the front door trim panel



Release catches (1) on both sides.

Remove the switch (2) from the handle recess (3) in direction of arrow.

Installation note:

Latch mechanisms (1) must not be damaged or missing.



**Necessary preliminary tasks:**

N12; N16; N18:

- Remove intake filter housing

N14:

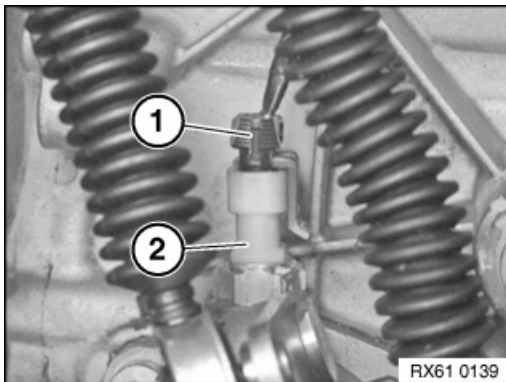
- Remove intake neck for intake silencer housing

N47T:

- Remove right charge-air duct

W16:

- Remove intake port
- Remove control unit for Digital Diesel Electronics
- Release the fuse box, engine compartment
- Remove bracket for the control unit for Digital Diesel Electronics / engine compartment fuse box



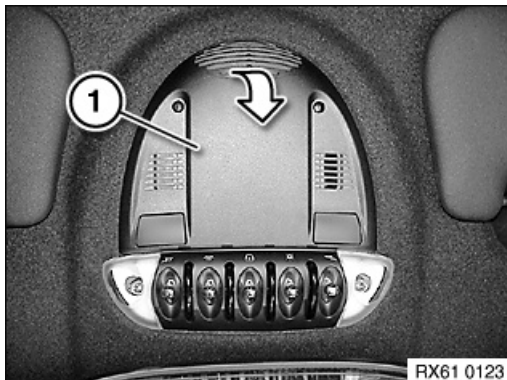
Disconnect plug connection (1).

Release reversing light switch (2) with a suitable tool. Tightening torque 61 31 1AZ.



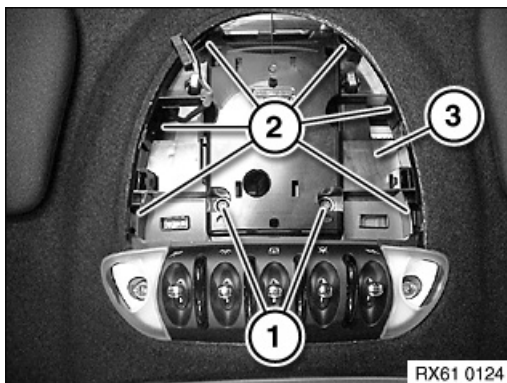
**Important!**

Read and comply with notes on protection against electrostatic damage (ESD protection).



Lever out the cover (1) from the roof operating facility.

If necessary, disconnect the microphone plug connection and remove the cover (1).



Release screws (1).

Unlock latch mechanisms (2).

Lower the roof operating facility (3).

Disconnect the associated plug connections and remove the roof operating facility (3).

Replacement:

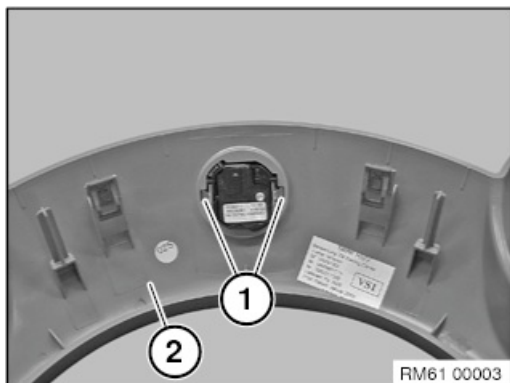
- If necessary, convert bulbs.





Necessary preliminary tasks:

- Remove cover for instruments



Unlock switch for hazard warning flashers (1) and press in direction of arrow out of cover for instruments (2). *Installation note:* Make sure switch for hazard warning flashers (1) is correctly seated.

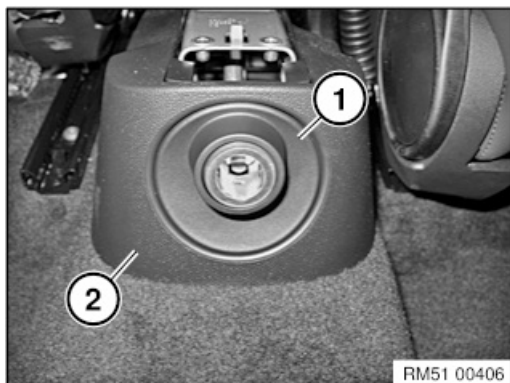


61 34 ... Removing and installing/replacing the power socket in the centre console (center rail)

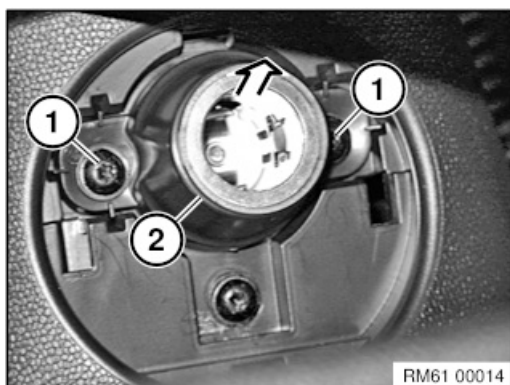


Special tools required:

- 64 1 020



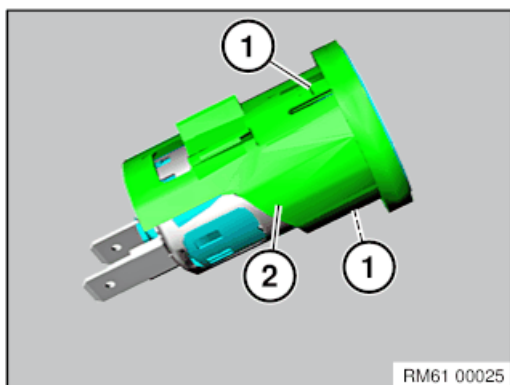
Lever the lid (1) out of the rear centre console cover (2) with the special tool 64 1 020 .



Release screws (1).

Pull the function carrier with power socket (2) out of the trim panel in direction of arrow.

Detach plug connection behind plate.



Note:

Power socket is shown removed for purposes of clarity.

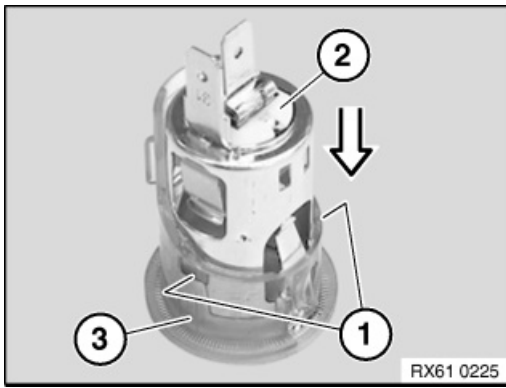
Replacement:

Unlock the latch mechanisms (1) with a suitable tool and press the power socket (2) out of the function carrier.

Installation note:

Latch mechanisms (1) on power socket (2) must not be damaged.





Release latch mechanisms (1) using a suitable tool and slide power socket (2) in the direction of arrow out of the illuminated ring (3). *Installation note:* Latch mechanisms (1) on illuminated ring (3) must not be damaged. Make sure power socket (2) is fitted correctly in illuminated ring (3).

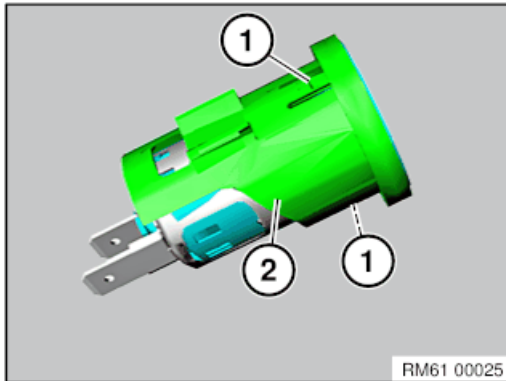


61 34 ... Removing and installing/replacing the power socket in the front cup holder



Necessary preliminary tasks:

- Remove front cup holder



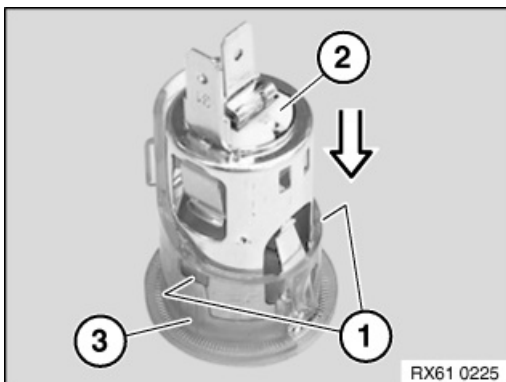
Note:

Power socket is shown removed for purposes of clarity.

Release the latch mechanisms (1) using a suitable tool and press the power socket (2) out of the front cup holder.

Installation note: Latch mechanisms (1) on power socket (2) must not be damaged.

Make sure that power socket (2) is correctly fitted in the cup holder.



Release latch mechanisms (1) using a suitable tool and slide power socket (2) in the direction of arrow out of the illuminated ring (3).

Installation note:

Latch mechanisms (1) on illuminated ring (3) must not be damaged.

Make sure power socket (2) is fitted correctly in illuminated ring (3).



61 31 134 Removing and installing/replacing USB audio interface connecting socket



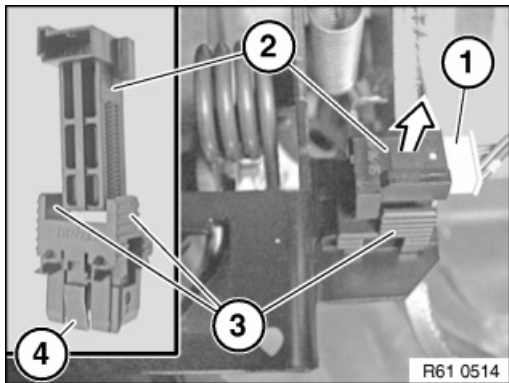
Operation is described in:

Removing and installing/replacing AV connecting socket



**Necessary preliminary tasks:**

- Remove lower trim from instrument panel

*Note:*

Brake light switch (2) is situated above the brake pedal.

Disconnect plug connection (1).

Pull brake light switch (2) in direction of arrow out of brake light switch holder (3).

Push the latch mechanisms (4) together and unclip the brake light switch holder (3) from the brake pedal.

Installation note:

Press brake pedal.

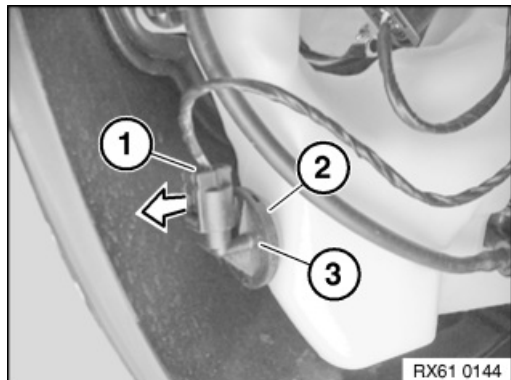
Push brake light switch (2) as far as it will go into brake light switch holder (3).

Grip brake light switch holder (3), slowly return brake pedal to initial position and pull back until limit position.



**Necessary preliminary tasks:**

- Partially remove front left wheel arch cover

**Current version:***Note:*

Catch any escaping washer fluid if necessary.

Disconnect plug connection (1).

Pull the level switch for window washer system (3) out of the washer fluid reservoir for the window washer system in the direction of the arrow.

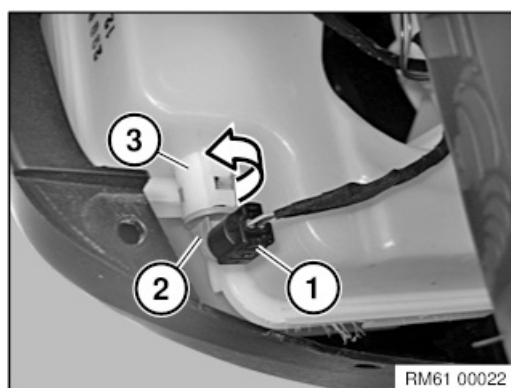
Installation note:

Grommet (2) must not be damaged.

Install the grommet (2) in the washer fluid reservoir for the window washer system first.

Make sure that the grommet (2) and level switch for the window washer system (3) are correctly fitted at the washer fluid reservoir for the window washer system.

Fill washer fluid reservoir.

**New version:**

Disconnect plug connection (1).

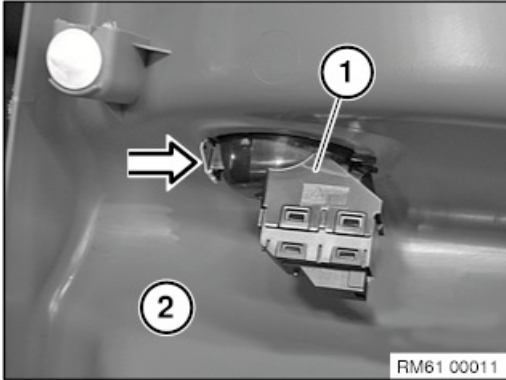
Turn the level switch for the windscreen washer system (2) in direction of arrow.

Pull the level switch for the window washer system (2) out of the washer fluid reservoir for the window washer system (3) toward the bottom.



**Necessary preliminary tasks:**

- Remove rear door trim panel

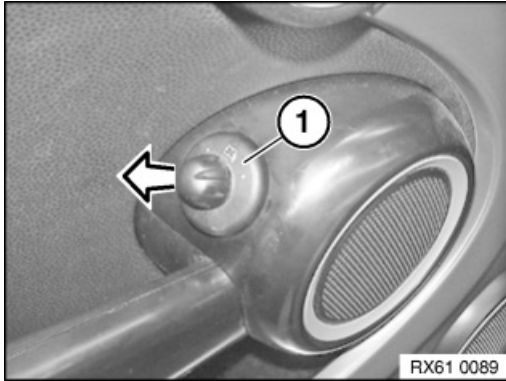


Disengage rocker switch (1) at retaining clip and feed out of door trim panel (2).



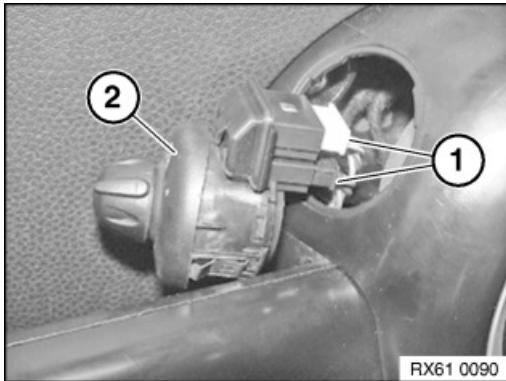
**Special tools required:**

- 00 9 340

*Note:*

Work shown on the R56 by way of example, deviations in detail are possible in other models.

Lever switch for exterior mirror (1) with special tool 00 9 340 in direction of arrow out of door trim panel.



Disconnect plug connection (1).

Remove switch for exterior mirror (2).



61 31 255

Replacing switch for exterior mirror



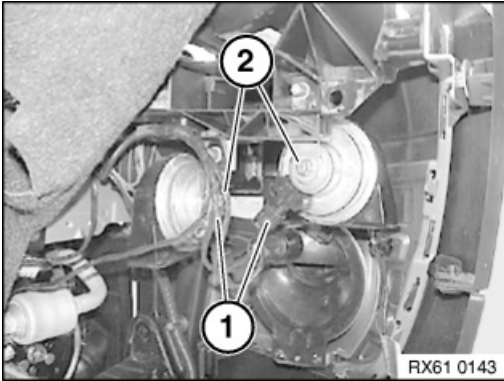
Operation is described in:

Removing power window switch (driver's side).



**Necessary preliminary tasks:**

- Partially remove front right wheel arch trim



Disconnect plug connection (1).

Release nuts (2) and remove fanfare horns. Tightening torque 61 35 3AZ.

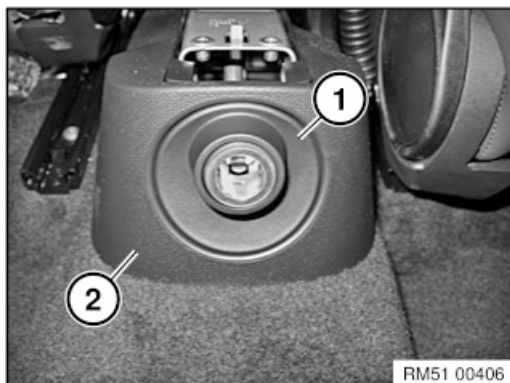


61 34 ... Removing and installing/replacing the power socket in the centre console (center rail)

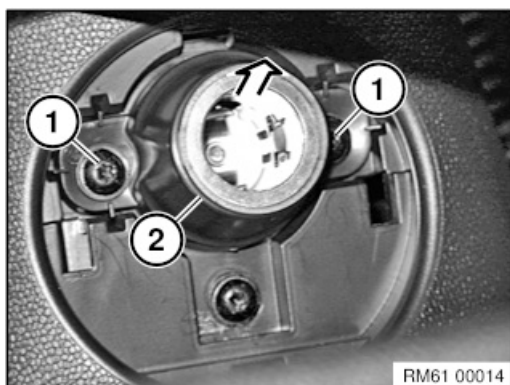


Special tools required:

- 64 1 020



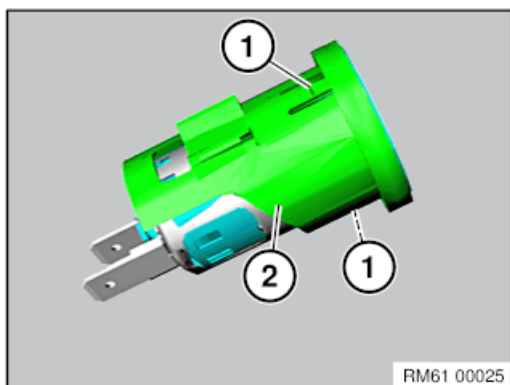
Lever the lid (1) out of the rear centre console cover (2) with the special tool 64 1 020 .



Release screws (1).

Pull the function carrier with power socket (2) out of the trim panel in direction of arrow.

Detach plug connection behind plate.



Note:

Power socket is shown removed for purposes of clarity.

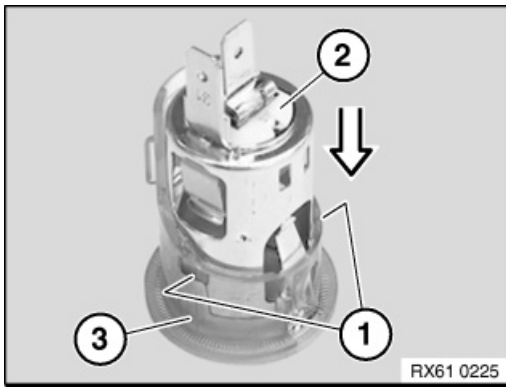
Replacement:

Unlock the latch mechanisms (1) with a suitable tool and press the power socket (2) out of the function carrier.

Installation note:

Latch mechanisms (1) on power socket (2) must not be damaged.





Release latch mechanisms (1) using a suitable tool and slide power socket (2) in the direction of arrow out of the illuminated ring (3). *Installation note:* Latch mechanisms (1) on illuminated ring (3) must not be damaged. Make sure power socket (2) is fitted correctly in illuminated ring (3).

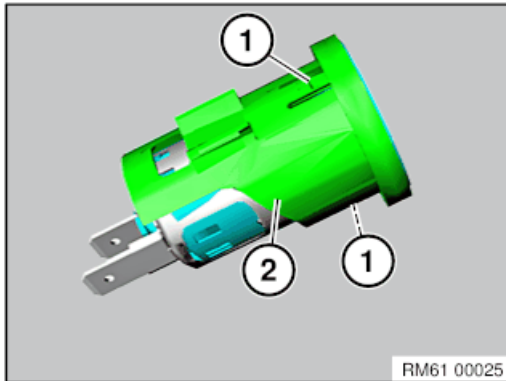


61 34 ... Removing and installing/replacing the power socket in the front cup holder



Necessary preliminary tasks:

- Remove front cup holder



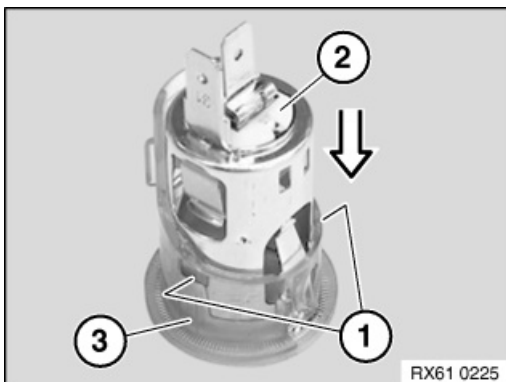
Note:

Power socket is shown removed for purposes of clarity.

Release the latch mechanisms (1) using a suitable tool and press the power socket (2) out of the front cup holder.

Installation note: Latch mechanisms (1) on power socket (2) must not be damaged.

Make sure that power socket (2) is correctly fitted in the cup holder.



Release latch mechanisms (1) using a suitable tool and slide power socket (2) in the direction of arrow out of the illuminated ring (3).

Installation note:

Latch mechanisms (1) on illuminated ring (3) must not be damaged.

Make sure power socket (2) is fitted correctly in illuminated ring (3).



*Note:*

Depending on the vehicle and the equipment, the following flat rate unit items are available for programming/encoding:

- 61 00 710
- 61 00 720
- 61 00 730

*Note:*

- In order to avoid incorrect programming procedures and fault messages, it is essential when working with the ISTA/P programming system always to use the version.
- Battery voltage must not drop below **13.0 V** during programming.
Only use chargers* recommended by BMW for low voltage vehicle electrical system.

*Sourcing reference Workshop Equipment Catalogue

programming routine via ISTA/P:

- Connect the battery charger to the vehicle.
- Connect the programming system with the vehicle.
- Determine the action plan.
- Accept action plan with the control units to be programmed/encoded and enabled, if necessary or work through.
- Observe the reworking list!
- If applicable, connect the workshop system to the vehicle depending on the rework list, run the brief test and delete the fault memory.

Note:

A switch to the workshop system may not necessarily be required with the integration of the service functions and the "Delete fault memory" function in ISTA/P. Check the rework list accordingly!

- The information about programming the workshop system and the corresponding notes in the user documentation must be observed.





Note:

Initialisation is necessary:

- after replacing windscreen
- after replacing the rain sensor
- after installing a used rain sensor



Note:

- Connect BMW diagnosis system
- Initialise rain sensor



**Special tools required:**

- 12 7 060

*Note:*

Electrical components which are particularly sensitive to electrostatic discharge (electronic control units, sensors, etc.) are marked with the ESD warning symbol.

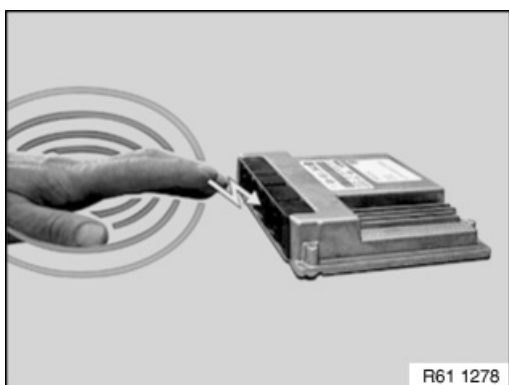
E-Electro

S-Static

D-Discharge

**Important!**

Read and comply without fail with the notes on this subject from Service Information **2 06 04 128**.

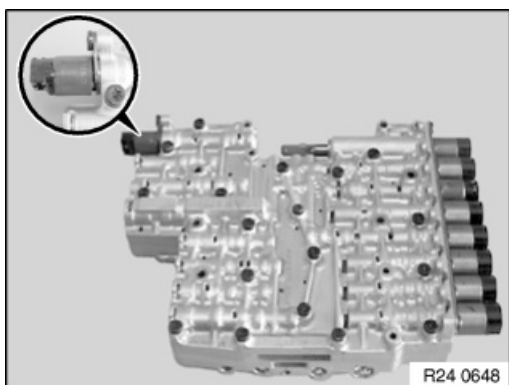


R61 1278

Statically charged persons can discharge themselves when they touch electrical components. *Note:*

Humans can only detect a discharge starting from a level of approx. 3000 V.

The danger threshold for electrical components already starts from a level of approx. 100 V.



R24 0648

Example:

Mechatronic control unit.





Important!

Do not touch pins and multi-pin connectors directly!

Touch electrical components by their housings only.



Important!

To avoid damaging or destroying electrical components as a result of electrostatic discharge, it is absolutely essential to observe the following instructions:

- When replacing electrical components, leave the replacement components in their original packaging until immediately before they are to be installed
- If necessary, always return a removed component in its original packaging (always pack the component away immediately)
- Read and comply with user information on using the associated special tool 12 7 060



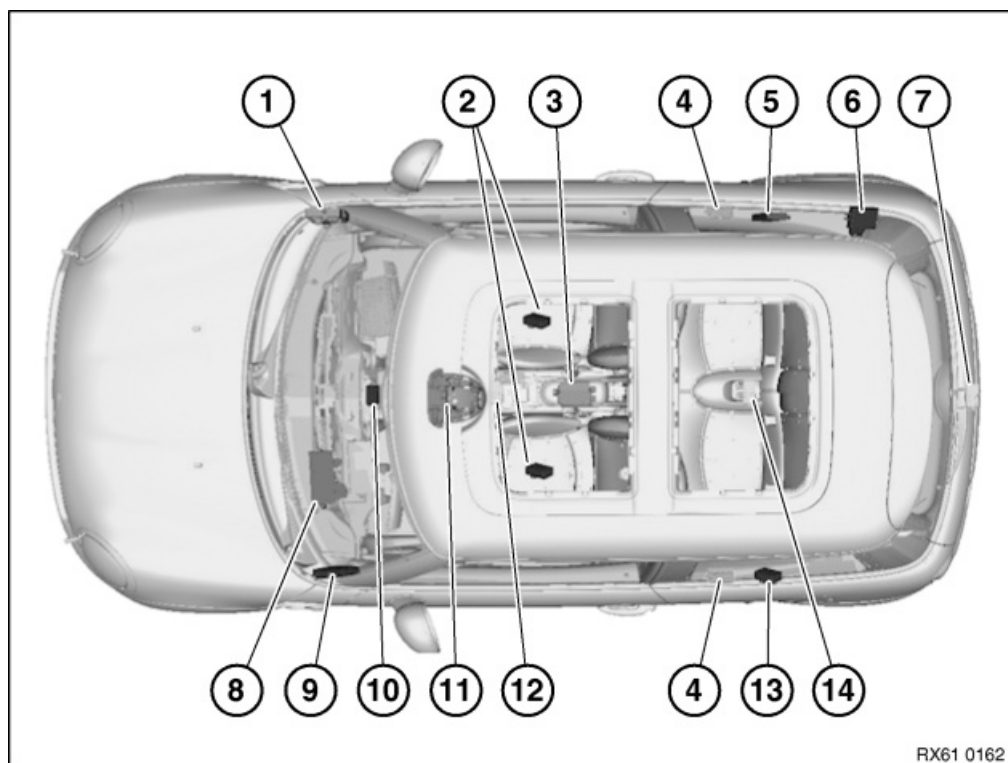
Personal protective equipment:

Electrically conducting clothing (high wool content, antistatic shoes required).

These can primarily be identified by the logo on the side.



61 35 .. Overview of control units



- | | |
|--|--|
| 1 Fuse box (SPEG) | 8 Control unit for Car Access System |
| 2 Seat module | 9 Footwell module |
| 3 Airbag control unit | 10 Rain/light sensor |
| 4 Interior aerial for comfort access system (side) | 11 Module for interior movement detector |
| 5 Control unit for comfort access system | 12 Interior aerial for comfort access system (front) |
| 6 Control unit for park distance control (PDC) | 13 Module for fold-in exterior mirror |
| 7 Bumper aerial for comfort access system | 14 Interior aerial for comfort access system (rear) |



61 35 ... Overview, rain sensor (additional work when replacing the windscreen / sensor replacement)

- **1-Series:** E8x
- **3-Series:** E9x
- **5-Series:** E6x
- **6-Series:** E6x
- **X1:** E84
- **Z4:** E89

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor/ Programming/encoding necessary	When replacing the sensor/ Initialisation required	Connecting the diagnosis system required
Condensation sensor square 30 x 20 mm	Yes	No	No	No

- **5-Series:** E6x
- **6-Series:** E6x
- **7-Series:** E6x

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing substitute visuals Programming/encoding necessary	When replacing the sensor/ substitute visuals Initialisation required	Connecting the diagnosis system required
all types square 60 x 40 mm	No	Yes	-	Yes	Yes
RLS approximately ø 50 mm	No (new substitute visuals required, refer to Electronic Parts Catalogue)	-	No	Yes	Yes

- **X5:** E70
- **X6:** E7x



Sensor type/ Sensor shape	With windscreen replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing substitute visuals Programming/encoding necessary	When replacing the sensor/ substitute visuals Initialisation required	Connecting the diagnosis system required
RLPSS (Rain, light and precipitation solar sensor) (Designation is located on the back of the sensor) approximately ø 50 mm	Yes	Yes	-	Yes	Yes
RLS (vehicle with no HUD) (Designation is located on the back of the sensor) approximately ø 50 mm	No (new substitute visuals required, refer to Electronic Parts Catalogue)	-	No	Yes	Yes
RLSS (vehicle with HUD) (Designation is located on the back of the sensor) approximately ø 50 mm	Yes	Yes	-	Yes	Yes

- **1-Series:** E8x
- **3-Series:** E9x
- **X1:** E84
- **X3:** E83
- **Z4:** E89

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing the sensor Initialisation required	Connecting the diagnosis system required
all types square 60 x 40 mm	No	Yes	Yes	Yes

- **5-Series:** F1x
- **5 Series GT:** F07
- **6-Series:** F06, F1x



- **7-Series:** F0x
- **X3:** F25
- **X4:** F26

Sensor type/ Sensor shape	With windscreen replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing substitute visuals Programming/encoding necessary	When replacing the sensor/ substitute visuals Initialisation required	Connecting the diagnosis system required
all types approximately ø 35 mm	No	No	-	Yes	Yes
all types approximately ø 50 mm	Yes	Yes	-	Yes	Yes
Only for F25 : RLS approximately ø 50 mm	No (new substitute visuals required, refer to Electronic Parts Catalogue)	-	No	Yes	Yes

- **X5:** F15, F85
- **X6:** F16, F86

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing the sensor Initialisation required	Connecting the diagnosis system required
all types approximately ø 35 mm	No	No	No	No

- **1-Series:** F2x
- **2-Series:** F2x
- **3-Series:** F3x, F8x
- **3 Series GT:** F34
- **4-Series:** F3x, F8x

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing the sensor Initialisation required	Connecting the diagnosis system required
------------------------------	--	---	---	---



all up to 03/2014 except SBS (01) (Designation is located on the back of the sensor) approximately ø 35 mm	No	No	Yes	Yes
SBS (01) (Designation is located on the back of the sensor) approximately ø 35 mm	No	No	No	No
All as from 03/2014 approximately ø 35 mm	No	No	No	No

• **2-Series: F4x**

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing the sensor Initialisation required	Connecting the diagnosis system required
all types	No	No	No	No

BMW i:

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing the sensor Initialisation required	Connecting the diagnosis system required
all types approximately ø 35 mm	No	No	No	No

BMW from G series

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing the sensor Initialisation required	Connecting the diagnosis system required
all types	No	No	No	No

MINI (all):

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing the sensor Initialisation required	Connecting the diagnosis system required
all types square 60 x 40 mm	No	Yes	Yes	Yes



all types approximately ø 35 mm	No	No	No	No
---	----	----	----	----

Rolls-Royce:

- RR1
- RR2
- RR3
- RR4
- RR5
- RR6

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing the sensor Initialisation required	Connecting the diagnosis system required
all types square 60 x 40 mm	No	Yes	Yes	Yes
all types approximately ø 35 mm	No	No	Yes	Yes
all types approximately ø 50 mm	Yes	Yes	Yes	Yes

Rolls-Royce:

- RR11
- RR12

Sensor type/ Sensor shape	With windscreen replacement replacement sensor required	When replacing the sensor Programming/encoding necessary	When replacing the sensor Initialisation required	Connecting the diagnosis system required
all types approximately ø 35 mm	No	No	No	No





Important!

Read and comply with notes on protection against electrostatic damage (ESD protection).

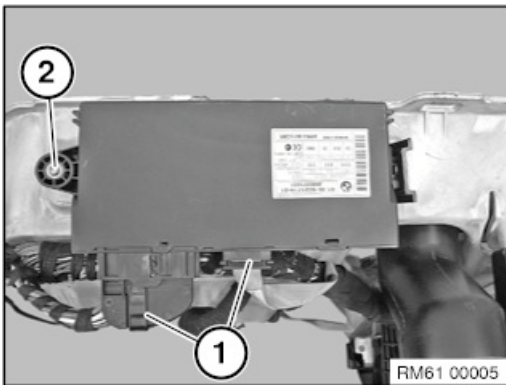
Note:

The Car Access System is a radio-based system and can be interfered with by radio waves from other systems (e.g. mobile phone).



Necessary preliminary tasks:

- Disconnect battery negative cable
- Remove dashboard top section trim panel



Unlock plug connections (1) and disconnect.

Release screw (2).

Remove control unit for Car Access System



Replacement:

- Carry out programming/encoding



61 35 950 Removing and installing (replacing) control unit for comfort access system



Important!

Read and comply with notes on protection against electrostatic damage (ESD protection).

Note:

The comfort access system is a radio-based system and can be interfered with by radio waves from other systems (e.g. mobile phone).



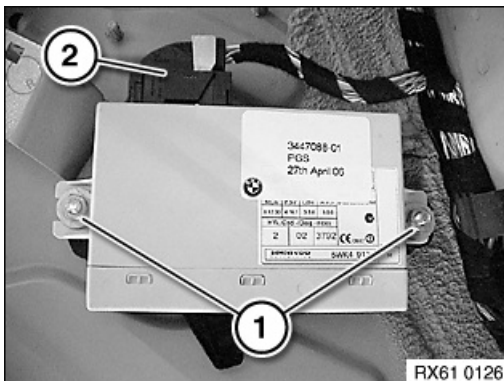
Necessary preliminary tasks:

R60 only:

- Remove the right cover in the luggage compartment wheel arch panel

R61 only:

- Remove right luggage compartment wheel arch panel.



Unscrew nuts (1).

Unfasten plug connection (2) and disconnect.

Remove control unit for comfort access system.



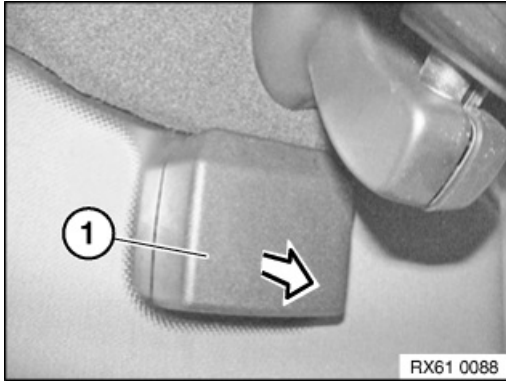
Replacement:

- Carry out vehicle programming/encoding

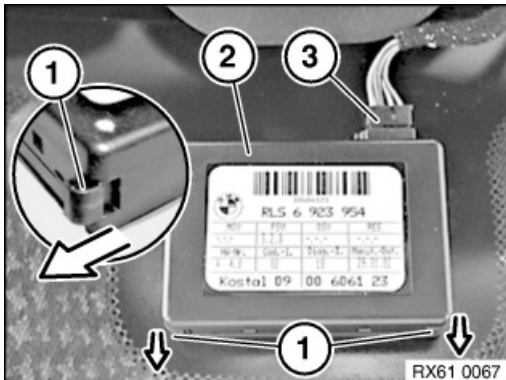


**Important!**

Read and comply with notes on protection against electrostatic discharge (ESD protection).



Unclamp cover (1) in direction of arrow and remove.



Pull out locks (1) in direction of arrow and remove rain/light sensor (2).
Disconnect plug connection (3).

Installation note:

Do not damage optical element covered by rain/light sensor (2).

Replacement:

Encode JBE and initialise rain/light sensor (2).





Warning!

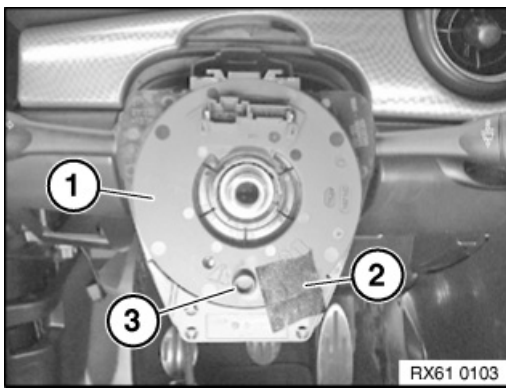
Move wheels into straight-ahead position and do not alter this position during the repair work.

Do not under any circumstances turn the mounting for the steering column switch cluster when the steering wheel is removed.



Necessary preliminary work:

- Remove lower section of steering column shroud

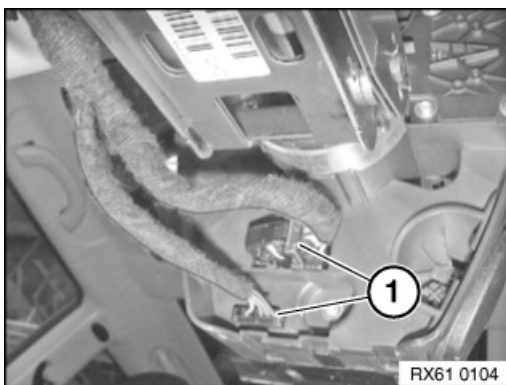


Warning!

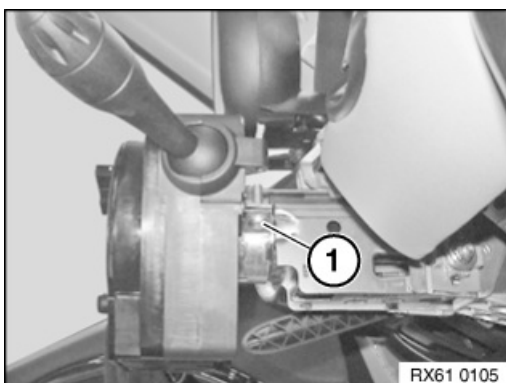
Secure coil spring cassette (1) against rotating with adhesive tape (2).

If unauthorised rotation of coil spring cassette (1) can not be ruled out, it is essential to return coil spring cassette (1) to centre position.

- Turn clock spring counterclockwise to limit position.
- Turn the clock spring clockwise to the limit position, while doing this count the number of rotations
- Turn the clock spring back to centre position (half of the rotations counted before) and secure so that the centring pin (3) is at the bottom position

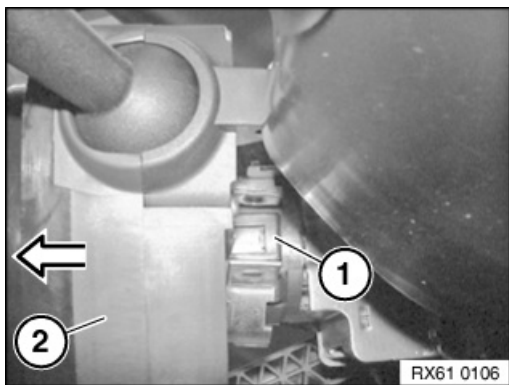


Disconnect plug connection (1).



Release screw (1).



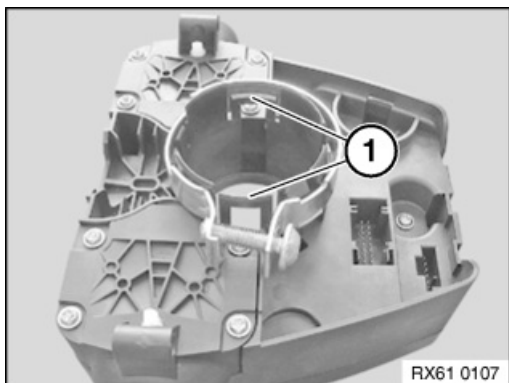


Attention!

Risk of damage!

Unlock the retaining tab (1) and retaining tab on the opposite side to the outside.

Remove steering column switch cluster (2) in direction of arrow.



Installation note:

Retaining tabs (1) must not be damaged



Replacement:

- Carry out vehicle programming/encoding
- Version with Dynamic Stability Control (DSC): perform steering angle sensor adjustment

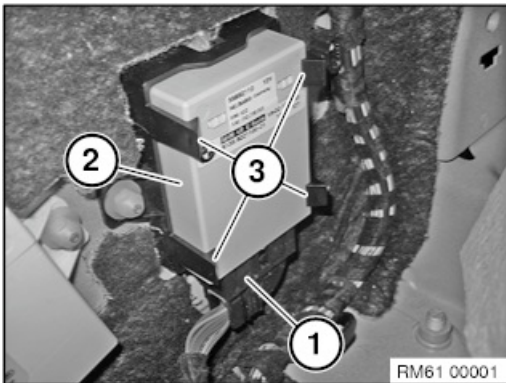


**Important!**

Read and comply with notes on protection against electrostatic damage (ESD protection).

**Necessary preliminary tasks:**

- Partially remove luggage compartment wheel arch panel on left



Unfasten plug connection (1) and disconnect.

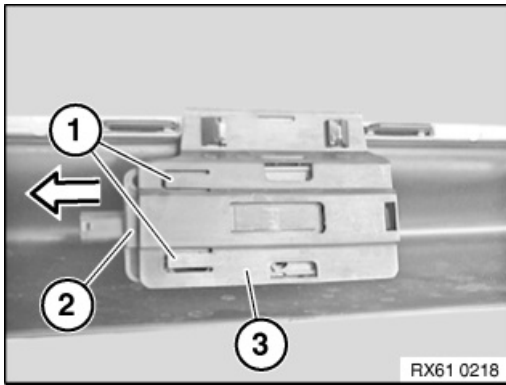
Unlock and remove the trailer module (2) on the latch mechanism (3).

**Replacement:**

- Carry out vehicle programming/encoding



61 35 975 Removing and installing/replacing bumper aerial for comfort access system



On R55, R60:

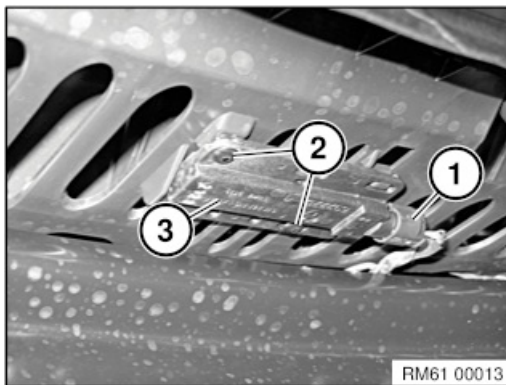
Note:

Shown with bumper panel removed for purposes of clarity.

Disconnect associated plug connection.

Unlock latch mechanisms (1).

Feed the bumper aerial for the comfort access system (2) out of the holder (3) in the direction of the arrow.



On R61:

Note:

Shown with bumper panel removed for purposes of clarity.

Unfasten plug connection (1) and disconnect.

Release expanding rivet (2).

Remove the bumper aerial for the comfort access system (3) from the support.





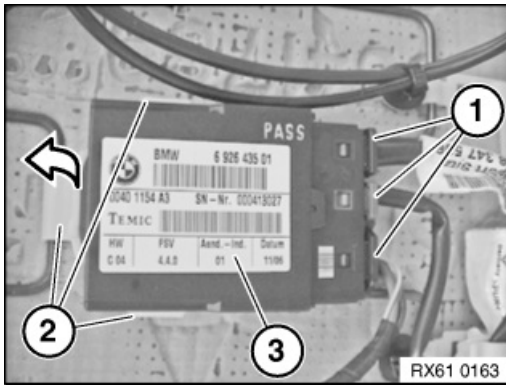
Important!

Read and comply with notes on protection against electrostatic damage (ESD protection).



Note:

Move seat completely towards rear/top.



Disconnect plug connection (1).

Unlock latch mechanisms (2) and remove control unit/module for seat heating (3) in direction of arrow.

Installation note:

Latch mechanisms (2) must not be damaged.

Make sure control unit/module for seat heating (3) is correctly fitted.

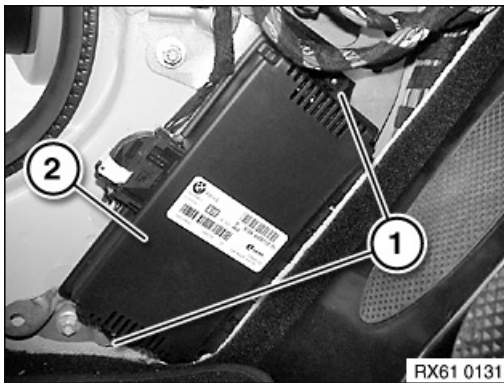


**Important!**

Read and comply with notes on protection against electrostatic damage (ESD protection).

**Necessary preliminary tasks:**

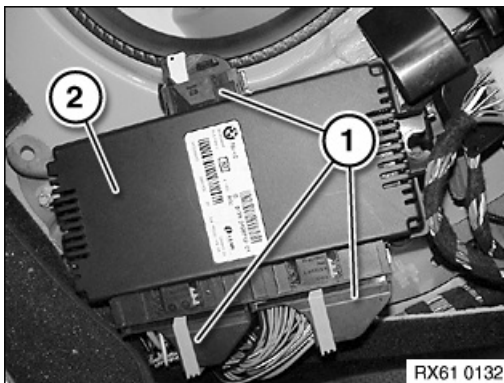
- Disconnect negative battery cable
- Remove front left entrance cover strip



Unscrew nuts (1).

Tightening torque 61 35 7AZ.

Pull footwell module (2) forwards a little.



Disconnect plug connections (1) and remove footwell module (2).

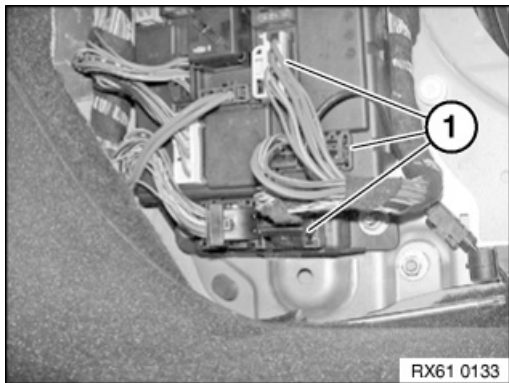
**Replacement:**

- Carry out vehicle programming/encoding.



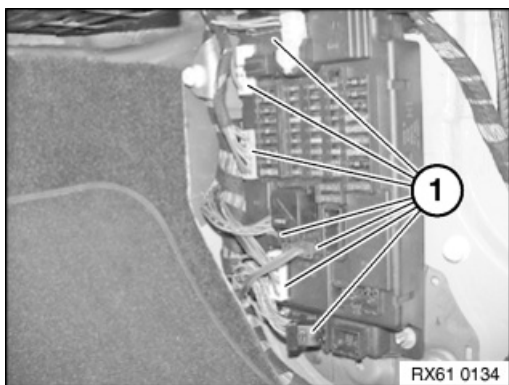
**Necessary preliminary tasks:**

- Disconnect battery earth lead
- Remove front right door sill cover strip

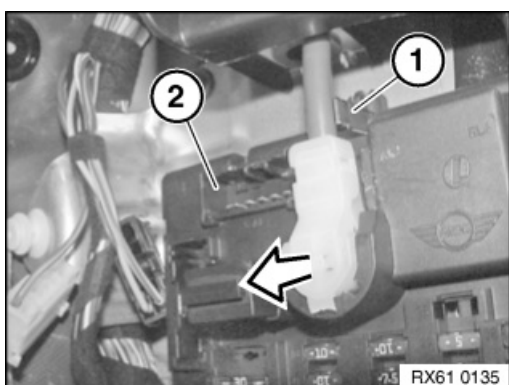


Disconnect plug connection (1). *Note:*

Write down colour and position of plug connections before removing.



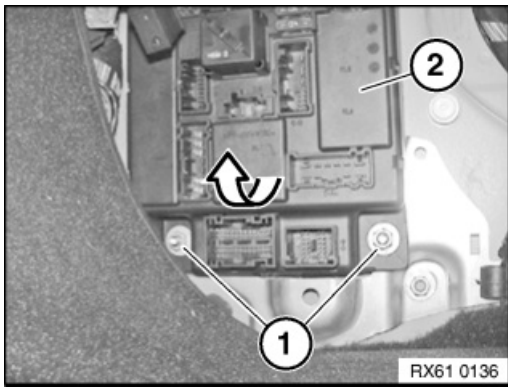
Disconnect plug connection (1).



Unclip the positive battery cable (1) from the holder.

Detach positive battery cable from fuse box (2).

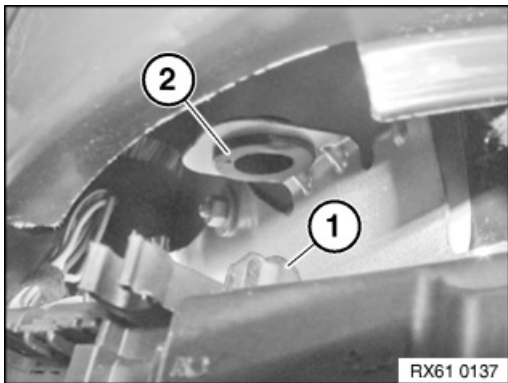




Unscrew nuts (1).

Tightening torque 61 35 7AZ.

Remove fuse box (2).



Installation note:

Make sure journal (1) is correctly seated in guide (2).



Replacement:

- Remount fuses and relays
- Carry out vehicle programming/encoding

Important!

Pin assignment changed as of 12/2008

Adjust pin assignment for vehicles with production date **up to 11/2008** according to the **wiring diagram** for vehicles with production date **from 12/2008**.

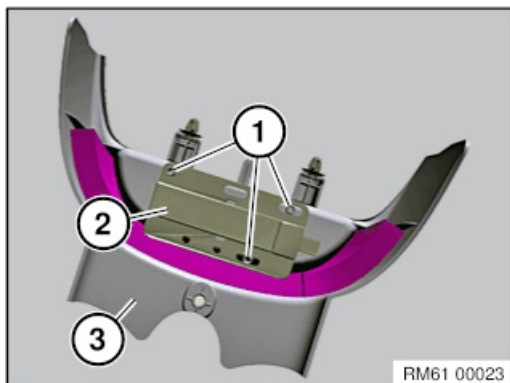


61 35 953 Removing and installing/replacing interior aerial for Comfort Access System (storage compartment, front)



Necessary preliminary tasks:

- Remove storage compartment



Release screws (1).

Remove the interior aerial for the comfort access system (2) from the storage compartment (3).

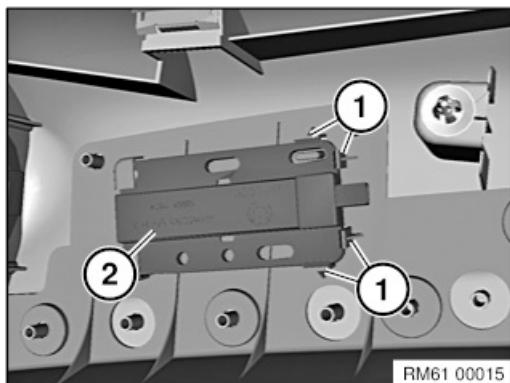


61 35 958 Removing and installing/replacing interior antenna for Comfort Access System on left or right (front door) (after vehicle diagnosis)



Necessary preliminary tasks:

- Remove front door trim panel



Unlock latch mechanisms (1) and take interior aerial (2) out of bracket. *Installation note:*

Make sure interior aerial (2) is correctly engaged in bracket.





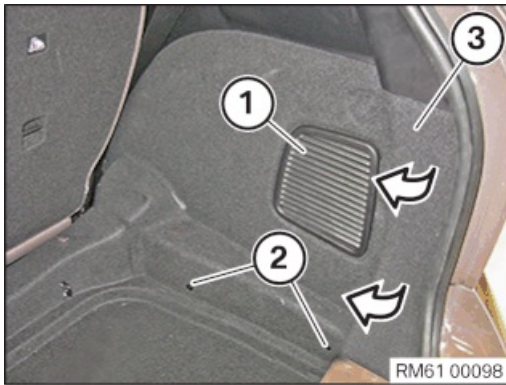
Important!

Read and comply with notes on protection against electrostatic discharge (ESD protection).



Necessary preliminary tasks:

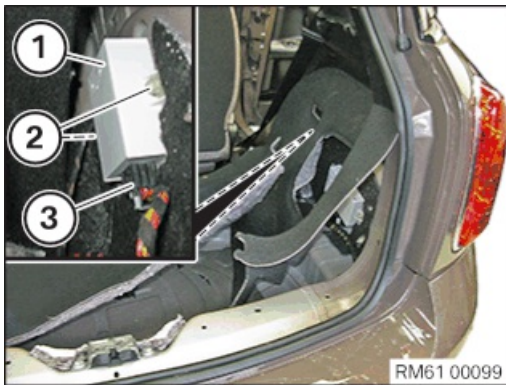
- Remove luggage compartment floor panel
- Remove trim on top of tail panel
- Remove luggage compartment light



Remove lid (1) from luggage compartment side trim panel (3).

Release expanding rivet (2).

Carefully fold away luggage compartment side trim panel (3) in direction of arrow.



Reach behind the luggage compartment side trim panel.

Release both nuts (2) and feed out the module for the folding exterior mirror (1).

Unfasten plug connection (3) and disconnect.

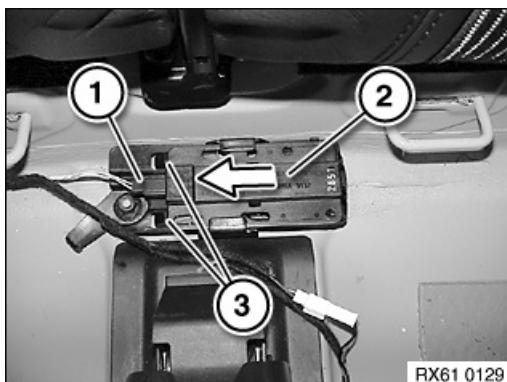


61 35 954 Removing and installing/ replacing interior aerial for comfort access system (rear seat)



Necessary preliminary tasks:

- Remove rear seat (not R60)
- Remove the trim cover from the rear of the floor trim (only R60)

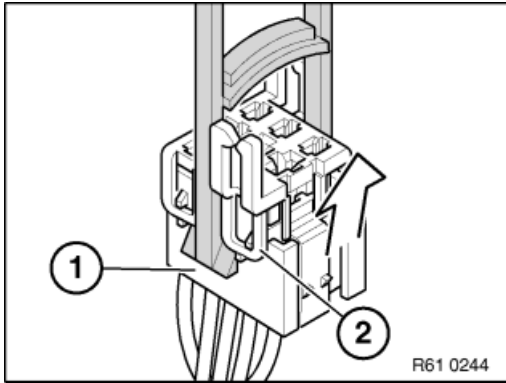


Disconnect plug connection (1).

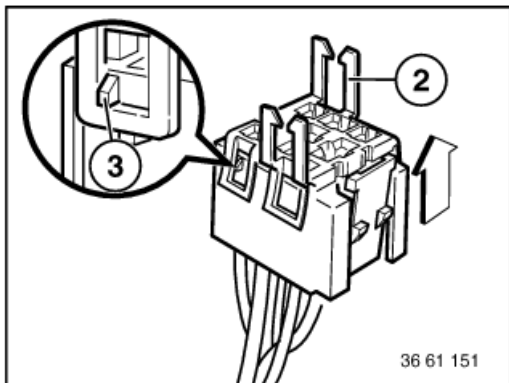
Unlock catches (3) and remove interior antenna for comfort access system (2) in direction of arrow from holder.



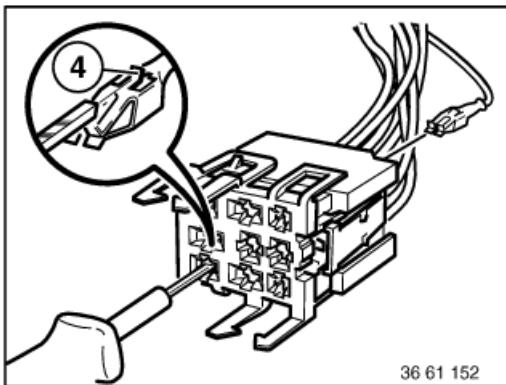
61 13 ... Relay carrier



Place special tool 61 1 153 against relay carrier (1) and carefully pull in direction of arrow until the locking tabs (2) of the relay carrier are raised up.



Pull relay carrier (2) in direction of arrow into the first catch (3).



Press down arrester hook (4) of corresponding contact and pull out the cable with contact.

With special tool 61 1 136 or 61 1 137 (press out) press out dual spring contacts.



**Necessary preliminary work:**

- Remove front left door sill cover strip

*Note:*

Instrument panel lower section shown removed for purposes of clarity.

Detach relay for heated windscreen (1).



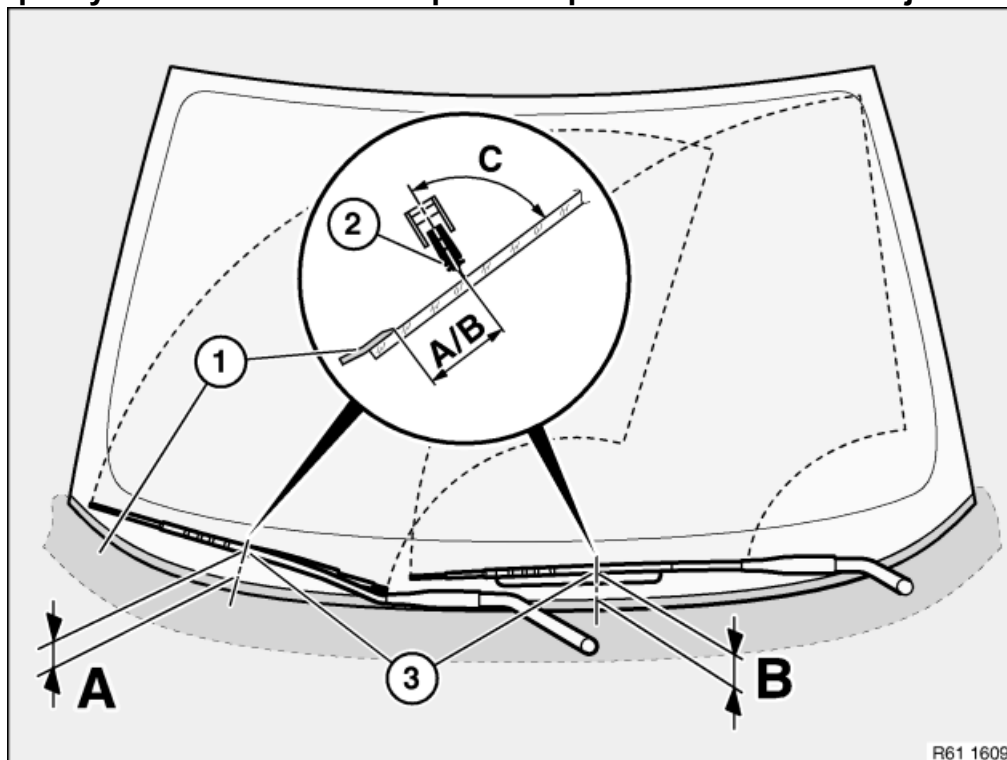
61 61 ... Adjusting left or right windscreen wiper



Special tools required:

- 61 6 100

A correctly adjusted contact angle of the wiper arms to the windscreen increases the wiping quality. Consult the vehicle specific repair instructions for adjustments.



A/B = Distance between wiper blade (2) and trim panel on cowl panel (1)

Note: Measurement is taken at the height of the locators (3) for the windscreen wiper arms

C= Contact angle between wiper blade centre plane and windscreen

When adjusting with special tool 61 6 100, set the scale value in accordance with the following table.

For RHD vehicles, change the preceding sign of the scale values.

- LHD cars, scale range 0 to --10
- RHD cars, scale range 0 to +10

Model	Contact angle (C) on windscreen wiper arm		Scale value (LHD) on special tool		Setting dimension (A, B) on windscreen wiper arm		
	Front front passenger side	Driver's side	Front front passenger side	Driver's side	Front front passenger side	Driver's side	Rear end
R50/R52/R53	$87^\circ \pm 1^\circ$	$87^\circ \pm 1^\circ$	-3	-3	59 ± 2.5 mm	49 ± 2.5 mm	44 ± 3 mm
R55	$87^\circ \pm 1^\circ$	$87^\circ \pm 1^\circ$	-3	-3	46 ± 2.5 mm	40 ± 2.5 mm	18 mm
R56/R58 / R59	$87^\circ \pm 1^\circ$	$87^\circ \pm 1^\circ$	-3	-3	46 ± 2.5 mm	40 ± 2.5 mm	38 mm
R60/R61	$87^\circ \pm 1^\circ$	$87^\circ \pm 1^\circ$	-3	-3	46 ± 2.5 mm	40 ± 2.5 mm	40 mm

61 61 010 windscreen

Checking/adjusting contact angle of windscreen wiper arms on



Special tools required:

- 61 6 100
- 00 9 220



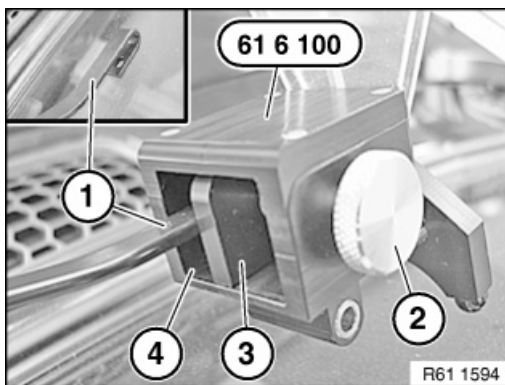
Note:

The wipe quality is improved by precise adjustment of the contact angles of the wiper arms.



Necessary preliminary tasks:

- Remove wiper blade



Insert wiper arm (1) in special tool 61 6 100 .

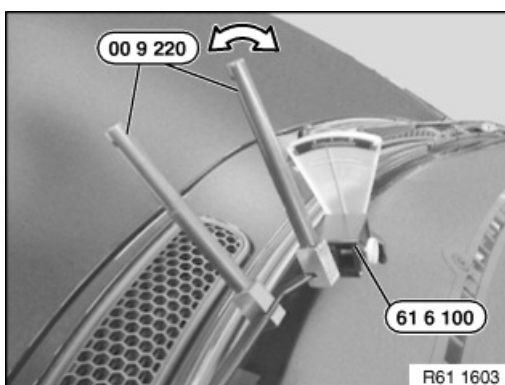
Secure the wiper arm (1) with screw (2) and pressure plate (3) and place onto the window glass.

Read the number of degrees and adjust the wiper arm, if necessary.

Note:

The wiper arm (1) must be placed correctly along the lower and side contact surface (4) of special tool 61 6 100 .

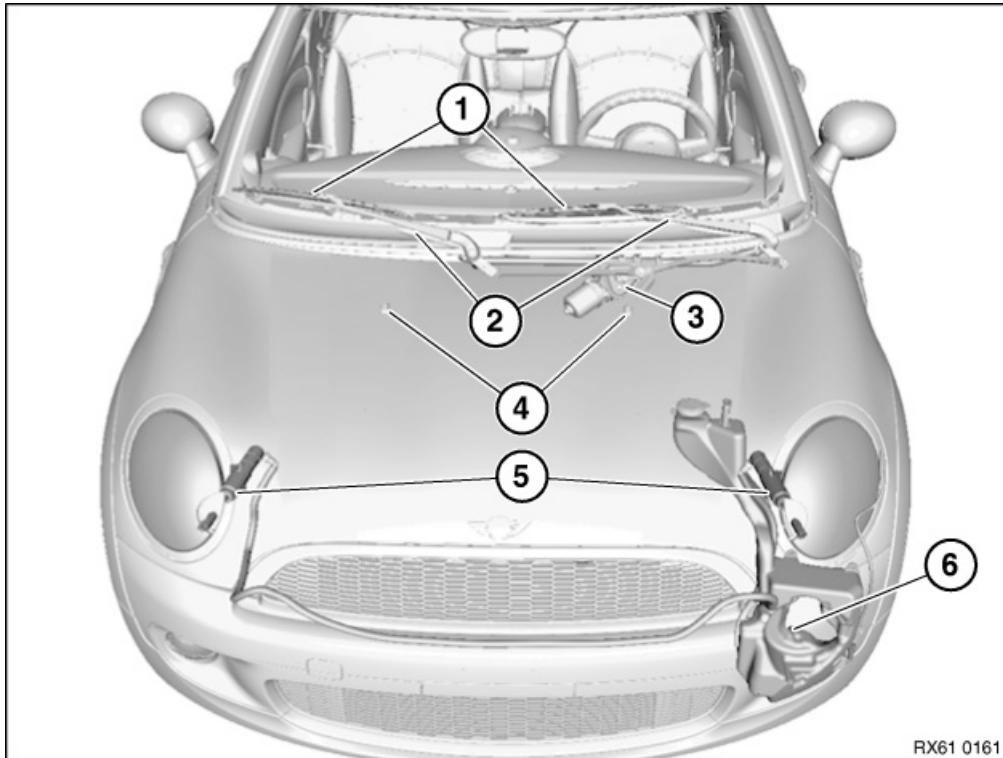
For right hand drive vehicles, the screw (2) must be located on the left side of special tool 61 6 100 .



Press special tools 00 9 220 into the corresponding direction until the correct contact angle is reached.



61 61 ... Overview of windscreen washer system and headlight cleaning system (SRA)



- | | | | |
|---|--|---|---|
| 1 | Wiper blades / wiper blade rubbers | 4 | Washer jets of the window washer system |
| 2 | Windscreen wiper arms | 5 | High-pressure nozzles for headlight washer system |
| 3 | Console for the wiper system completely with motor | 6 | Water reservoir / windscreen washer pumps |
-
- | | | | |
|-----|------------|-----|------------|
| R55 | Rear wiper | R56 | Rear wiper |
| R60 | Rear wiper | R61 | Rear wiper |

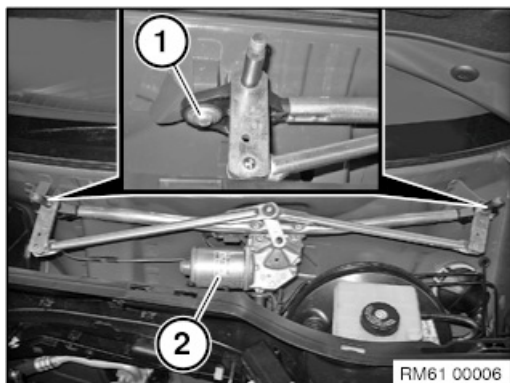


61 61 270 Removing and installing/replacing console for windscreen wiper system complete with motor



Necessary preliminary tasks:

- Remove left cowl panel cover



Release screws (1).

Tightening torque 61 61 2AZ.

Carefully raise wiper bracket (2), release and disconnect plug connection behind it.

Remove wiper bracket (2).

Installation note:

Make sure the wiper bracket (2) fits correctly.

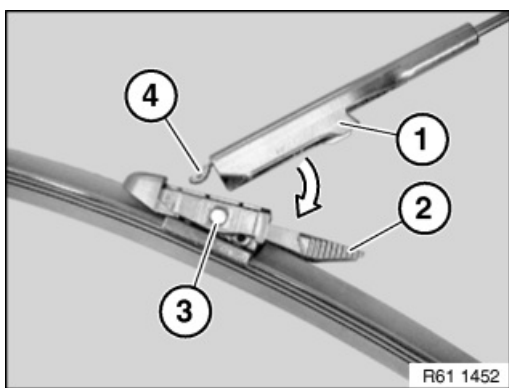


**Important!**

Make sure the wiper arm does not touch the windscreen without its wiper blade.

**Note:**

In the event of a **customer complaint** regarding the cleaning or wiping performance or noise build-up (scratching, squeaking) by the wiper blades, proceed as follows: **First check** whether the complaint is caused by dirt (preservation wax on new vehicles, resins or other environmental influences) on the windscreen; if necessary, **clean the windscreen thoroughly!** Replace the wiper blades only if cleaning the windscreen fails to remedy the situation.



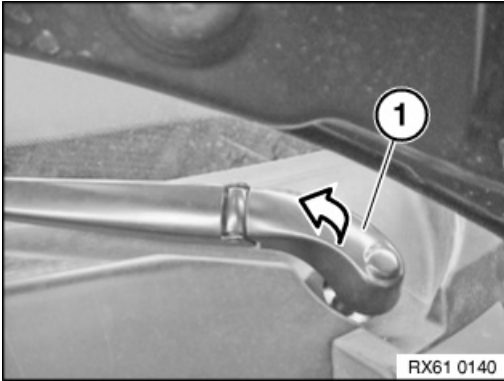
Fold wiper arm (1) away from windscreen. Press lock (2) and remove wiper blade (3) in direction of arrow. *Installation note:*

Make sure guide (4) is correctly seated in wiper blade (3).

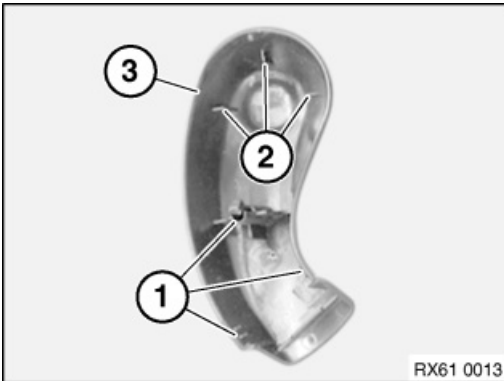


**Special tools required:**

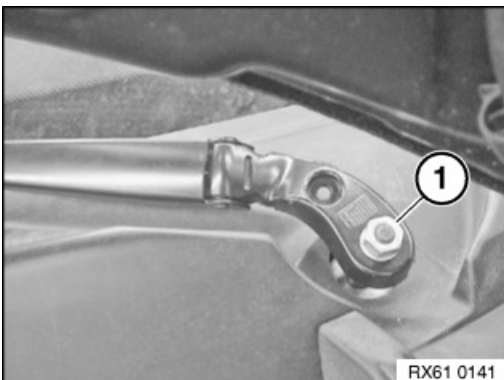
- 61 6 130



Pull off the protective cap (1).

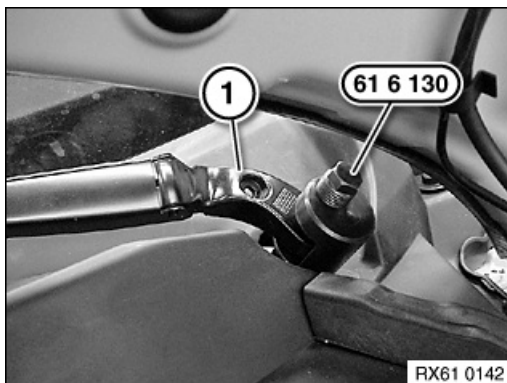


Catches (1) and fasteners (2) of the protective cap (3) must not be damaged.



Slacken nut (1). Tightening torque 61 61 1AZ.





Detach wiper arm with special tool 61 6 130 .

Remove the wiper blade.

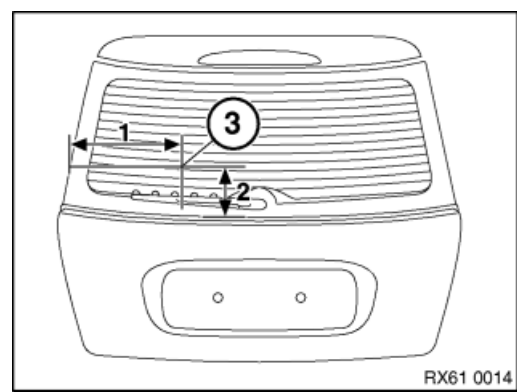
Installation note:

Adjust the setting of the wiper arms in rest position.



61 62 100

Adjust the washer jet for the rear window washer system.



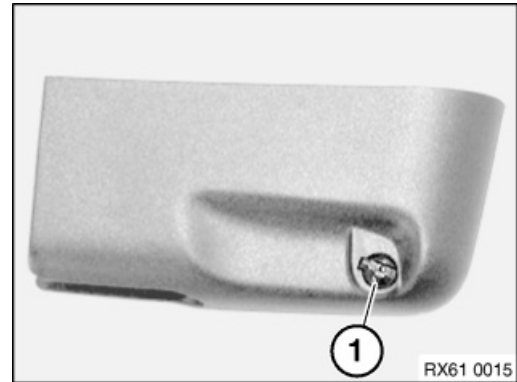
Setting dimension:

Dimension 1 [mm]	Dimension 2 [mm]
370	90

Note: Adjust the spray jet for the contact point (3).

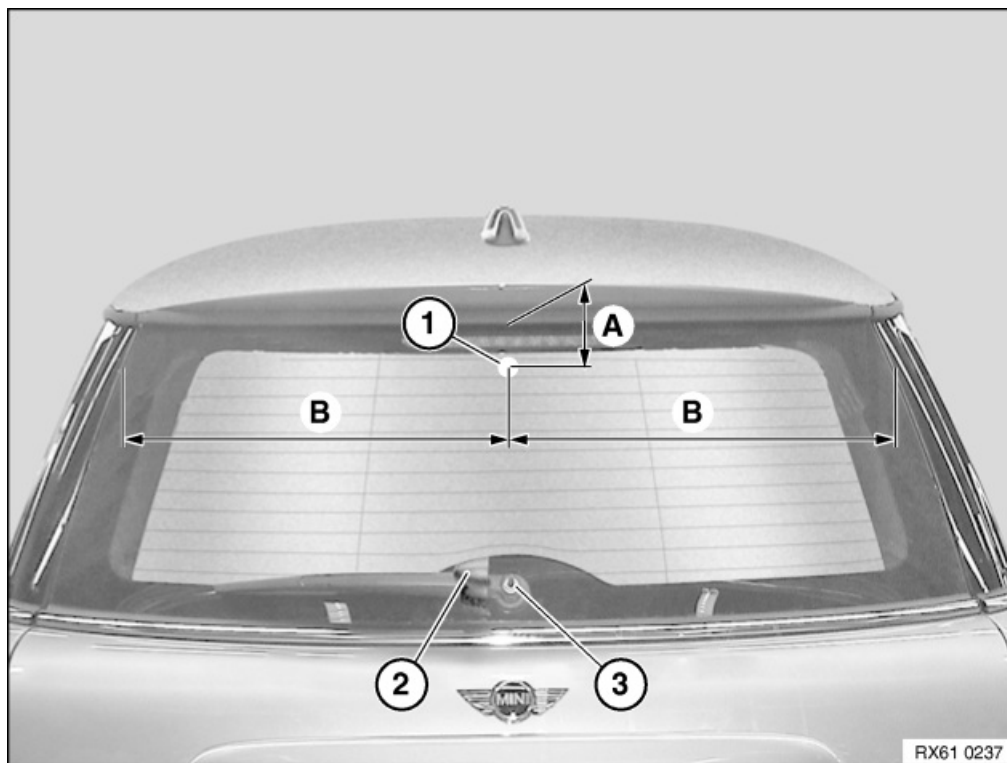


Important!
Do not insert pointed objects in the jet (risk of damage).



Mark the contact point with adhesive tape. Set the screwdriver into the slot and adjust the washer jet (1).



**Note:**

Rear wiper must be in rest position.

Mark the contact point (1) with adhesive tape (A=55 mm / B=490 mm).

Operate the window washer system.

The spray jet must hit the mark.

If necessary, adjust the washer jet (3).

Important!

Do not insert pointy objects into the washer jet (3) (risk of damage).

Open protective cap (2).

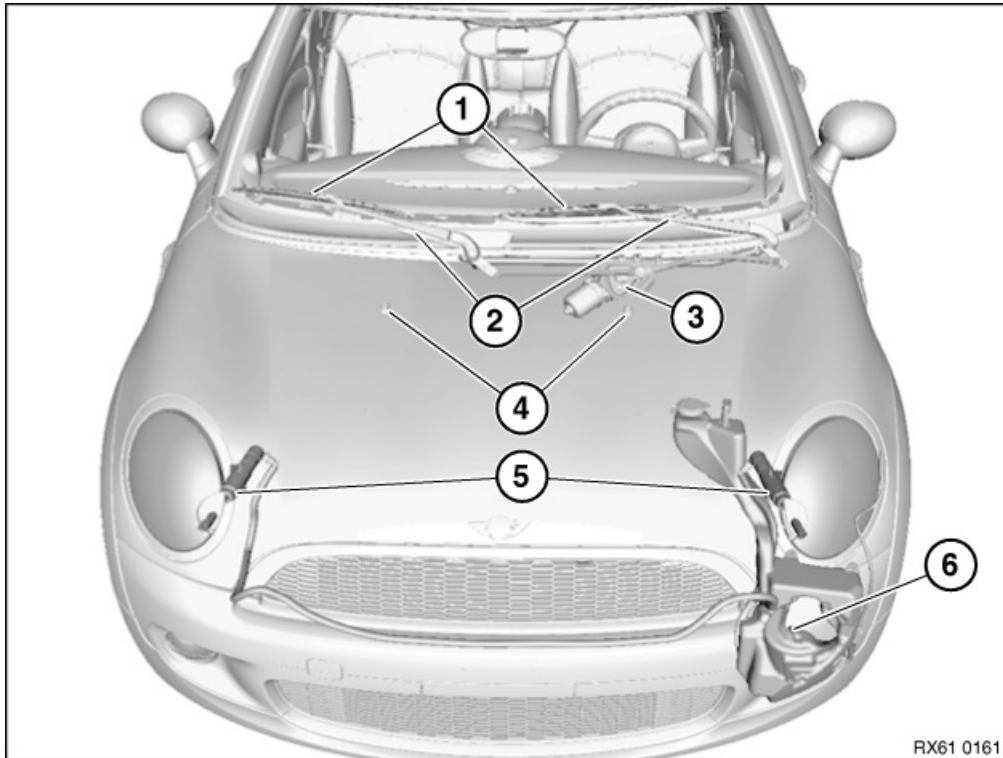
Use a suitable tool to adjust the washer jet (3) until the spray jet hits the mark.

If applicable, remove adhesive residue from the rear window.

Fill up with washer fluid.



61 61 ... Overview of windscreen washer system and headlight cleaning system (SRA)

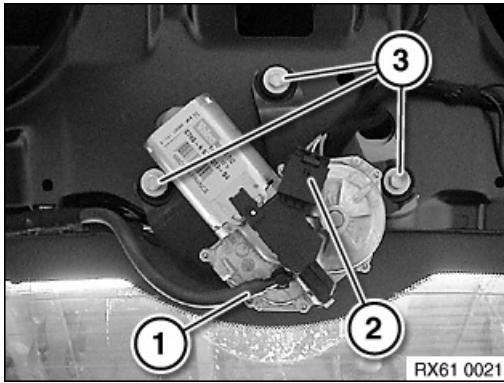


- | | | | |
|---|--|---|---|
| 1 | Wiper blades / wiper blade rubbers | 4 | Washer jets of the window washer system |
| 2 | Windscreen wiper arms | 5 | High-pressure nozzles for headlight washer system |
| 3 | Console for the wiper system completely with motor | 6 | Water reservoir / windscreen washer pumps |
-
- | | | | |
|-----|------------|-----|------------|
| R55 | Rear wiper | R56 | Rear wiper |
| R60 | Rear wiper | R61 | Rear wiper |



**Necessary preliminary tasks:**

- Remove wiper arm for rear wiper
- Remove trim for tailgate at bottom



Pull off hose (1).

Disconnect plug connection (2).

Release screws (3). Tightening torque 61 62 2AZ.

Pull rear wiper motor out of rear window grommet.

Installation note:

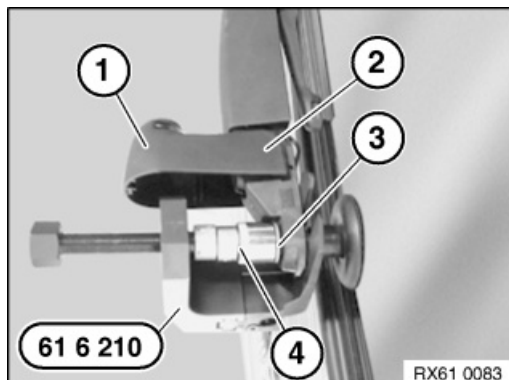
Check grommet of wiper pivot for signs of damage, replace if necessary.

Adjust washer jet.



**Special tools required:**

- 61 6 210



Open protective cap (1).

Slacken nut (3) two turns.

Tightening torque 61 62 1AZ.

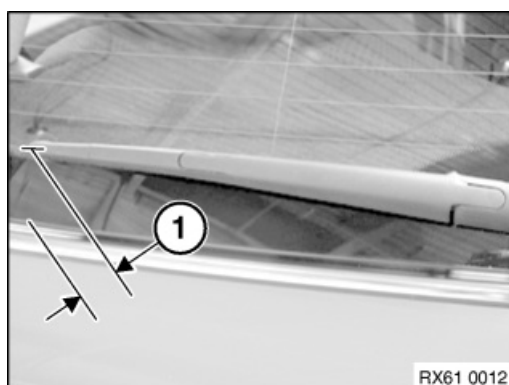
Important!

To avoid damaging the washer jet, it is necessary in addition to the special tool to use a suitable socket for detaching the rear wiper from the wiper motor.

Press off wiper arm (2) 61 6 210 with special tool and suitable socket (4).

Unscrew nut (3).

Remove wiper arm (2).

*Installation note:*

Rear wiper must be in rest position.

Adjust distance (1) between wiper arm and rear window edge.

(1) 44 mm

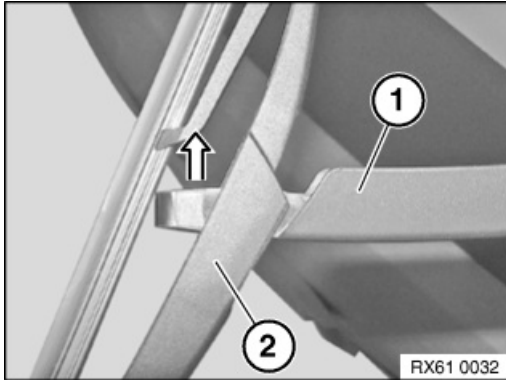
Replacement:

- Remove and install rear wiper blade.



**Important!**

Make sure the wiper arm does not contact the rear without its wiper blade.



Stand up wiper arm for rear wiper (1) and wiper blade for rear wiper (2).

Unclip wiper blade for rear wiper (1) in direction of the arrow from the wiper arm for (2) and remove.

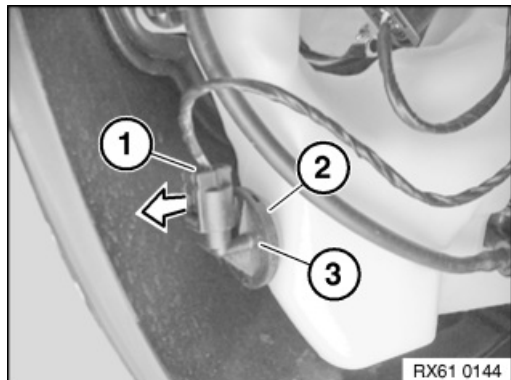
Installation note:

Make sure that the wiper blade for rear wiper (2) is correctly latched on the wiper arm for rear wiper (1).



**Necessary preliminary tasks:**

- Partially remove front left wheel arch cover

**Current version:***Note:*

Catch any escaping washer fluid if necessary.

Disconnect plug connection (1).

Pull the level switch for window washer system (3) out of the washer fluid reservoir for the window washer system in the direction of the arrow.

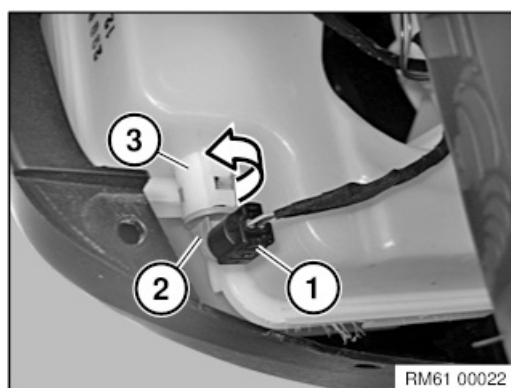
Installation note:

Grommet (2) must not be damaged.

Install the grommet (2) in the washer fluid reservoir for the window washer system first.

Make sure that the grommet (2) and level switch for the window washer system (3) are correctly fitted at the washer fluid reservoir for the window washer system.

Fill washer fluid reservoir.

**New version:**

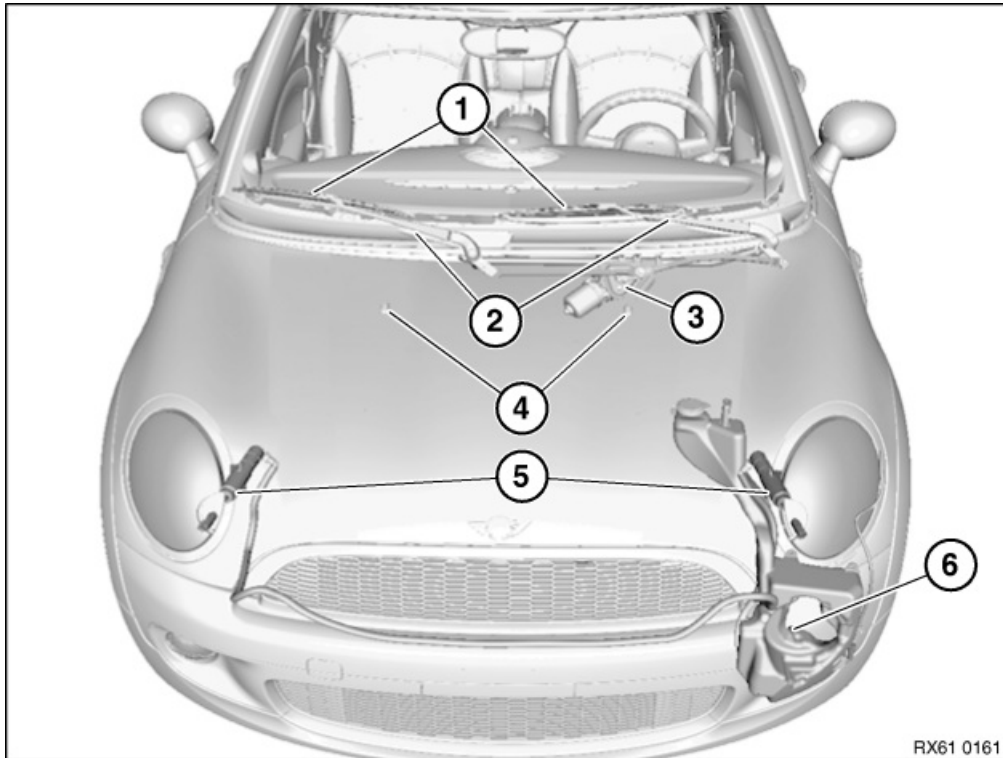
Disconnect plug connection (1).

Turn the level switch for the windscreen washer system (2) in direction of arrow.

Pull the level switch for the window washer system (2) out of the washer fluid reservoir for the window washer system (3) toward the bottom.



61 61 ... Overview of windscreen washer system and headlight cleaning system (SRA)



- | | | | |
|---|--|---|---|
| 1 | Wiper blades / wiper blade rubbers | 4 | Washer jets of the window washer system |
| 2 | Windscreen wiper arms | 5 | High-pressure nozzles for headlight washer system |
| 3 | Console for the wiper system completely with motor | 6 | Water reservoir / windscreen washer pumps |
-
- | | | | |
|-----|------------|-----|------------|
| R55 | Rear wiper | R56 | Rear wiper |
| R60 | Rear wiper | R61 | Rear wiper |

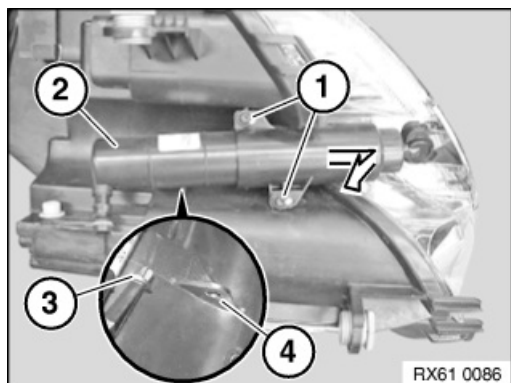


61 67 083 Removing and installing / replacing left or right high-pressure nozzle of headlight washer system



Necessary preliminary tasks:

- Remove headlight



Release screws (1).

Tightening torque 63 12 3AZ.

Remove high-pressure nozzle (2) in direction of arrow.

Installation note:

Make sure guide (3) is correctly seated in lug (4).



Press holder for chrome trim (1) in direction of arrow off high-pressure nozzle (2).



61 67 010 Removing and installing/replacing washer pump for headlight cleaning system

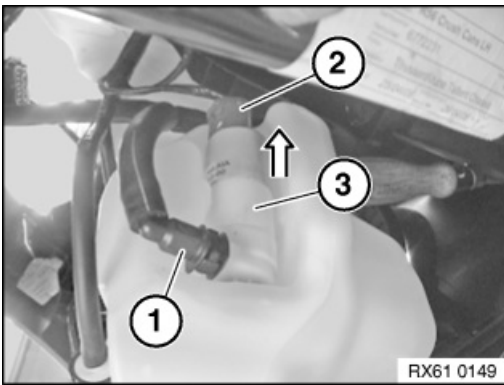


- Before replacing the pump, check the washer fluid reservoir for dirt contamination and clean if necessary!



Necessary preliminary tasks:

- Partially remove front left wheel arch cover



Note:

Catch any escaping washer fluid if necessary.

Unlock latch mechanism (1) and remove hose pipe from washer pump for headlight cleaning system (3).

Disconnect plug connection (2).

Turn washer pump for headlight cleaning system (3) clockwise and pull out of washer fluid reservoir for window washer system.

Installation note:

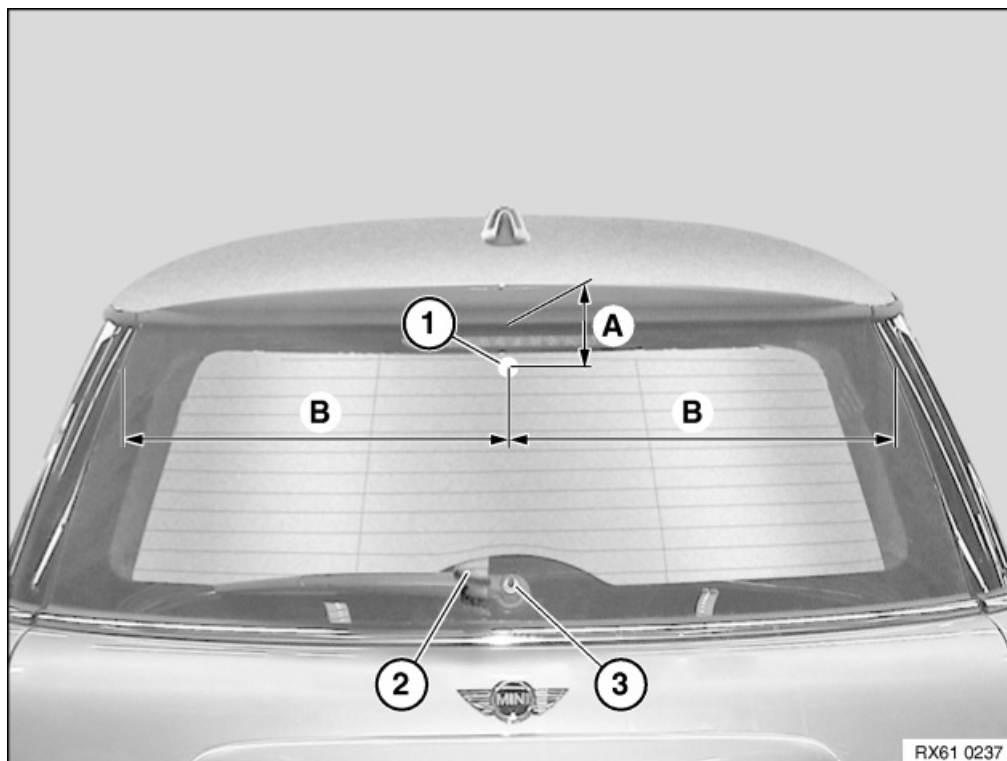
Replace strainer of washer pump for headlight cleaning system (3).

Coat sealing ring of washer pump for headlight cleaning system (3) with lubricant.

Ensure hose pipe is laid without kinks.

Fill washer fluid reservoir.



**Note:**

Rear wiper must be in rest position.

Mark the contact point (1) with adhesive tape (A=55 mm / B=490 mm).

Operate the window washer system.

The spray jet must hit the mark.

If necessary, adjust the washer jet (3).

Important!

Do not insert pointy objects into the washer jet (3) (risk of damage).

Open protective cap (2).

Use a suitable tool to adjust the washer jet (3) until the spray jet hits the mark.

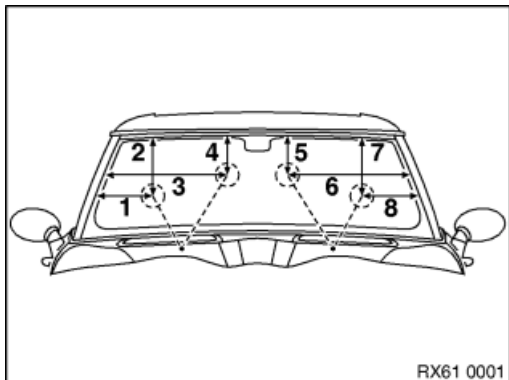
If applicable, remove adhesive residue from the rear window.

Fill up with washer fluid.



**Special tools required:**

- 00 9 200



Mark the contact points with adhesive tape on the windscreen.

Actuate windscreen washer system.

The spray jets must hit in the area of the marks.

Adjustment values in mm:

1 = 270

2 = 360

3 = 530

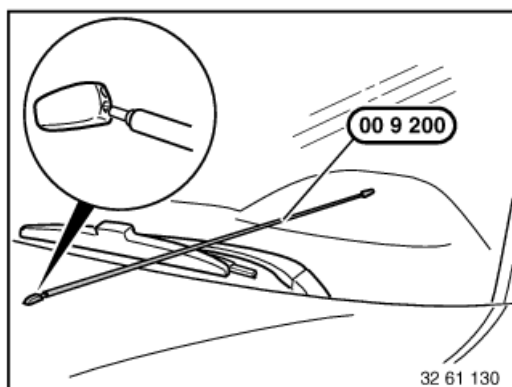
4 = 240

5 = 240

6 = 530

7 = 360

8 = 270



If applicable, adjust the left or right washer jet with special tool 00 9 200 .

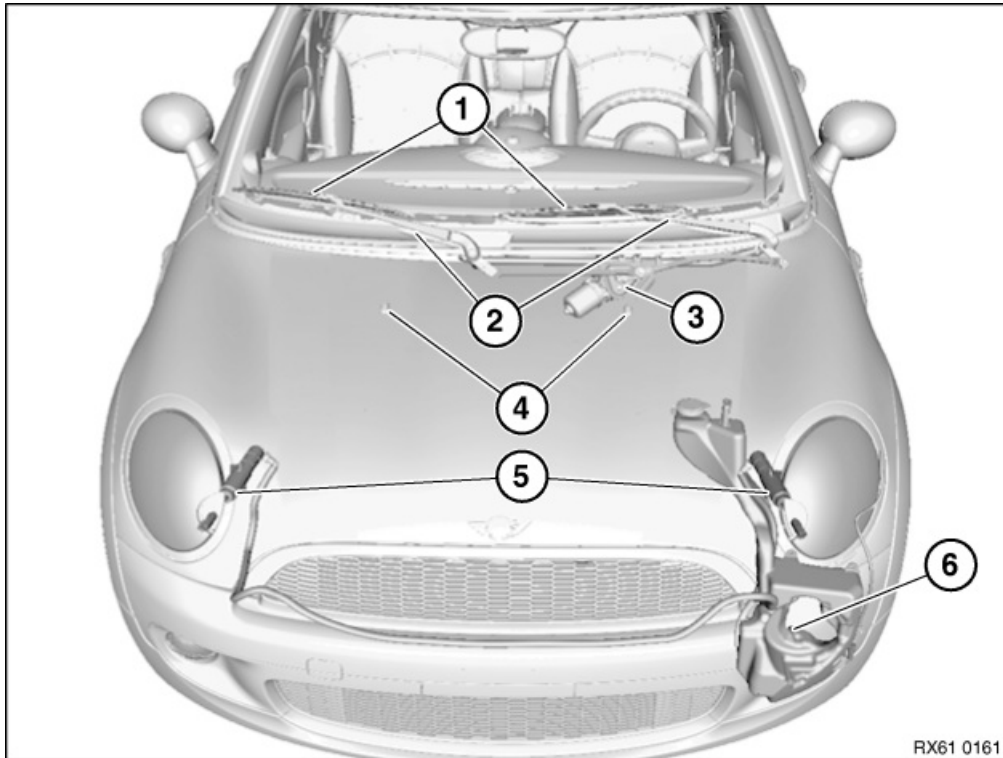
Note:

If necessary, remove adhesive residue from windscreen.

Fill up with washer fluid.



61 61 ... Overview of windscreen washer system and headlight cleaning system (SRA)



- | | | | |
|-----|--|-----|---|
| 1 | Wiper blades / wiper blade rubbers | 4 | Washer jets of the window washer system |
| 2 | Windscreen wiper arms | 5 | High-pressure nozzles for headlight washer system |
| 3 | Console for the wiper system completely with motor | 6 | Water reservoir / windscreen washer pumps |
| R55 | Rear wiper | R56 | Rear wiper |
| R60 | Rear wiper | R61 | Rear wiper |

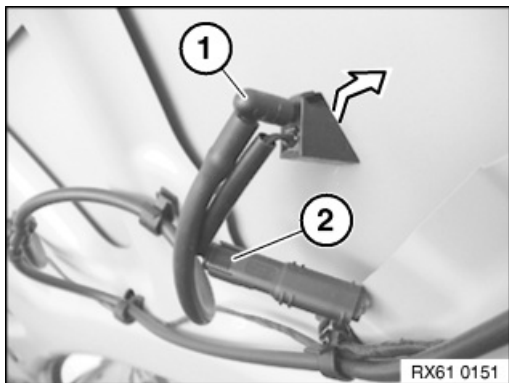


61 71 015 Removing and installing/replacing a washer jet in windscreen washer system



Necessary preliminary tasks:

- If applicable, remove the damping material on the engine compartment lid in the area of the washer jet



Pull off hose (1).

If necessary, disconnect plug connection (2).

Press out washer jet of the window washer system in direction of arrow.

Installation note:

Check contact points of spray jets.

If applicable, adjust washer jet.

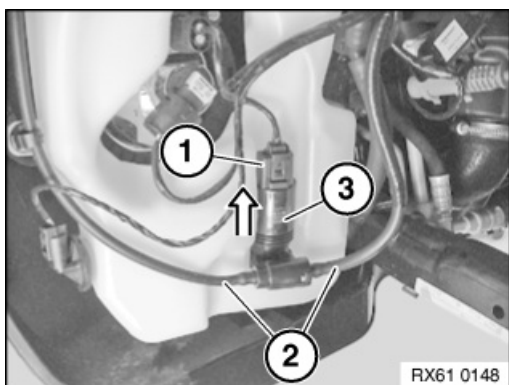




- Before replacing the windscreen washer pump, check the washer fluid reservoir for dirt contamination and clean if necessary!

**Necessary preliminary tasks:**

- Partially remove front left wheel arch cover

**Note:**

Catch any escaping washer fluid if necessary.

Disconnect plug connection (1).

Detach hose pipes (2) from windscreen washer pump (3).

Pull windscreen washer pump (3) up and out of washer fluid reservoir for windscreen washer system.

Installation note:

Replace strainer for windscreen washer pump (3).

Coat sealing ring of windscreen washer pump (3) with lubricant.

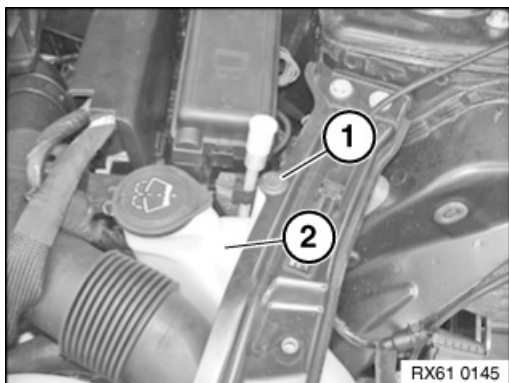
Ensure hose pipes are laid without kinks.

Fill washer fluid reservoir.

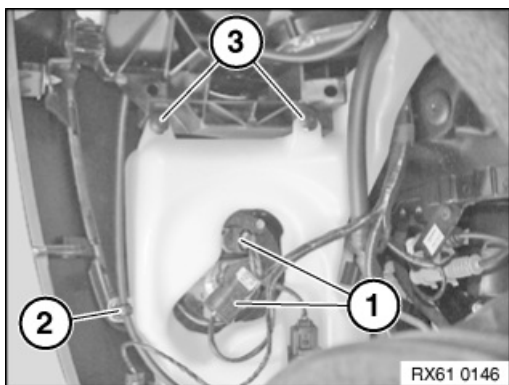


**Necessary preliminary tasks:**

- Remove front left wheel arch trim
- Remove left headlight



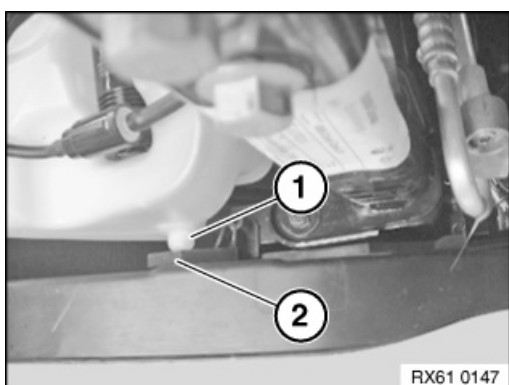
Remove expanding rivet (1) from fluid reservoir for windscreen washer system (2).



Disconnect plug connection (1).

Remove retaining clip (2) from fluid reservoir for windscreen washer system.

Release screws (3).



Remove level switch for windscreen washer system.

Remove windscreen washer pump.

If necessary, remove washer pump for headlight cleaning system.

Lift out fluid reservoir for windscreen washer system from opening (2) using a suitable tool.

Thread out fluid reservoir for windscreen washer system.

Installation note:

Guide (1) must be correctly seated in opening (2).

Ensure hose pipes and wiring harness are laid without kinks.

Fill fluid reservoir.





The following applies in general:

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies:

Shielded lines

Interference radiation and interference resistance can lead to neutral zones at contact points in the shielding. Consequently, distinctions have to be drawn between the following types:

Coaxial lines

- Shielded coaxial cables RTK031 may only be repaired with special crimping tool.
- For aerial lines only the bushing contact may be repaired.
- RG174 Lines and the bushing contact may not be repaired.

CVBS lines

- CVBS cables may not be repaired.
- CVBS cables must be replaced in their entirety.

HSD lines

- HSD cables may not be repaired.
- HSD cables must be replaced in their entirety.

Optical fibre cable:

Note:

Fibre-optic cables are coloured differently as follows:

- Green = **MOST** (Media Oriented Systems Transport) optical fibres
- Yellow = **ISIS** (Intelligent Safety and Integration System) optical fibres
- Orange=repair fibre-optic cables

Attention!

- Fibre-optic cables are permitted to show only one junction point (bridge), replace fibre-optic cables if necessary
- Smallest permissible bending radius is 25 mm
- Avoid effects of heat $\geq 85^\circ$

Treating cables and optical fibres

FlexRay (twisted cables)

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

Note:

- FlexRay lines may only reveal one separation point (bridge) per line



- Flexray lines may only reveal one separation point (bridge); renew complete line if necessary.
- If possible, maintain twisted cable after repair.
- After repairs, twist cables as close as possible to the connector/separation point.
- Twisting must be as symmetrical as possible.

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables

Replacing wiring harnesses

Repair wiring harnesses mainly cover the full equipment of the vehicle. If certain optional equipment is not installed in the vehicle, note the following:

- If necessary, secure the remaining connectors.
- If necessary, seal the remaining connectors outside the vehicle interior, for example, with butyl tape in such a way that moisture ingress can be eliminated permanently.

Note:

Repair wiring harnesses can be equipped with an **additional socket housing** (e.g. 30-pin), **which was not provided on the previous vehicle-side wiring harness**. This socket housing also cannot be found in the wiring diagram.

Procedure

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **in the vehicle interior** (in the footwell, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.
- Alternatively, a suitable pin housing can be fitted on the vehicle-side wiring harness and connected to the additional socket housing.

However, this is permitted only if the following conditions are met:

- Carpets must not protrude visibly or become deformed due to the installation of the additional plug connection.
- It must be possible to install the adjacent components (for example, trims, trim panels, etc.) correctly after installing the additional plug connection.
- All the attachment points of the adjacent components (for example, trims, trim panels, etc.) must engage correctly.
- There must be no rattling noise due to the installation of the additional plug connection.
- The additional plug connection must not damage the adjacent components/wiring harnesses, etc..

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **outside the vehicle interior** (in the wheel arch, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.



- **Using the additional socket housing is not permitted with a separation point outside the vehicle interior.**

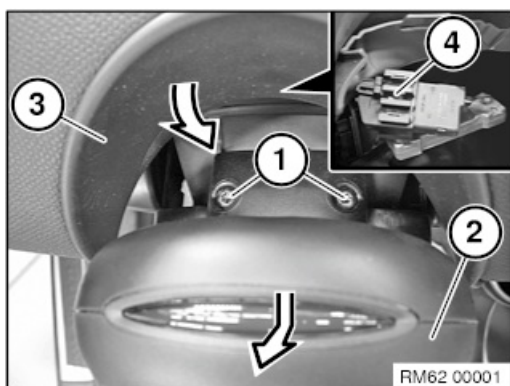


**Attention!**

Read and comply with notes on protection against electrostatic damage (ESD protection).

**Necessary preliminary tasks:**

- Disconnect battery negative cable



Release screws (1).

Carefully pull rev counter (2) in direction of arrow.

Raise trim panel (3) in direction of arrow and unlock the connector housing behind it.

Unlock plug connection (4) and disconnect.

Installation note:

Make sure rev counter wiring harness is correctly laid.

Replacement:

Carry out programming/encoding.

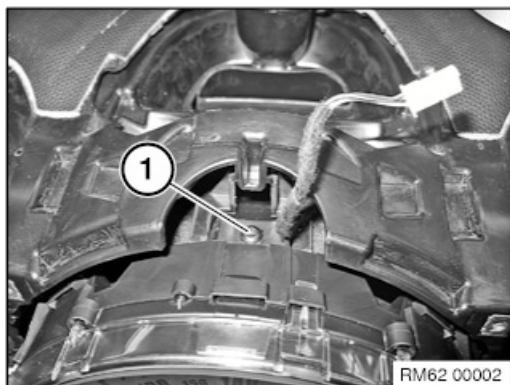


**Important!**

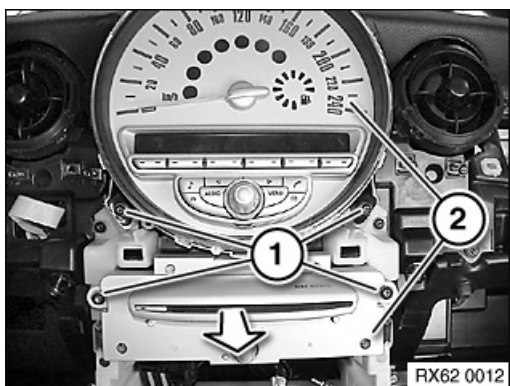
Read and comply with notes on protection against electrostatic discharge (ESD protection).

**Necessary preliminary tasks:**

- Disconnect battery negative cable
- Remove centre console cover



Release screw (1).



Release screws (1).

Pull back complete instrument panel (2) slightly.

Unlock and disconnect the plug connections behind the instrument panel (2) and remove the instrument panel in direction of arrow.

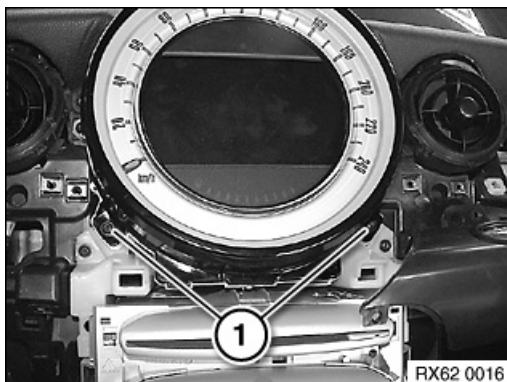


**Important!**

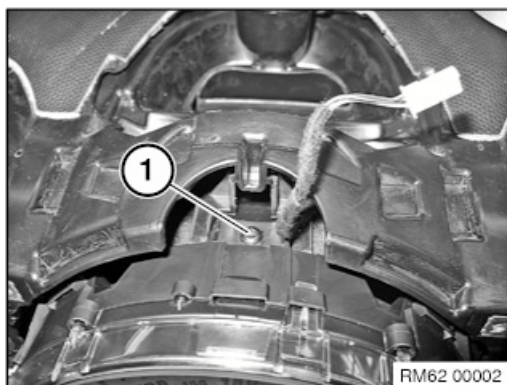
Read and comply with notes on protection against electrostatic damage (ESD protection).

**Necessary preliminary tasks:**

- Disconnect battery negative cable
- Remove centre console cover

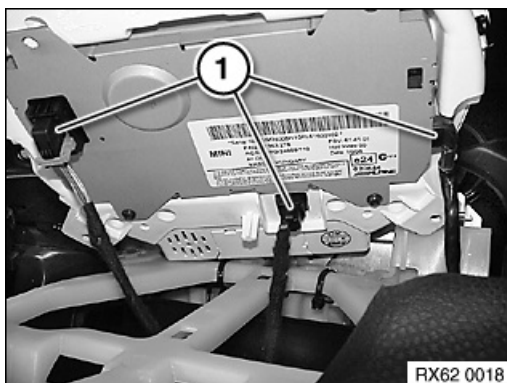


Release screws (1).



Release screw (1).

Pull back complete instrument panel slightly.



Unlock and disconnect plug connections (1) and take off instrument panel.

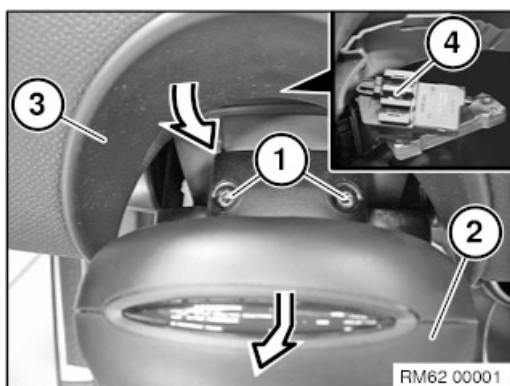


**Attention!**

Read and comply with notes on protection against electrostatic damage (ESD protection).

**Necessary preliminary tasks:**

- Disconnect battery negative cable



Release screws (1).

Carefully pull rev counter (2) in direction of arrow.

Raise trim panel (3) in direction of arrow and unlock the connector housing behind it.

Unlock plug connection (4) and disconnect.

Installation note:

Make sure rev counter wiring harness is correctly laid.

Replacement:

Carry out programming/encoding.

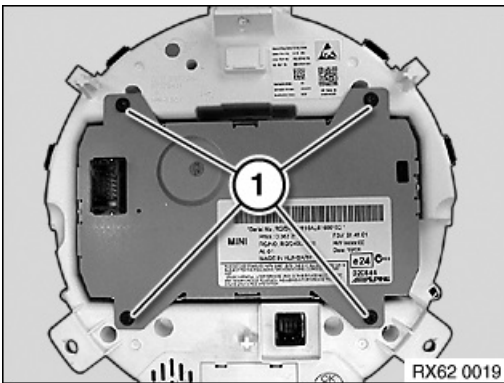


**Important!**

Read and comply with notes on protection against electrostatic discharge (ESD protection).

**Necessary preliminary tasks:**

- Disconnect battery negative cable
- Remove complete navigation instrument panel



Release screws (1).

Remove navigation display from instrument cluster.

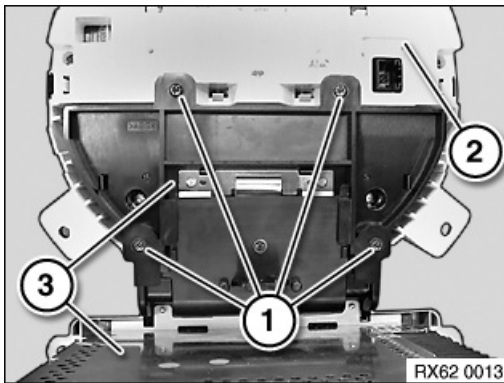


**Important!**

Read and comply with notes on protection against electrostatic discharge (ESD protection).

**Necessary preliminary tasks:**

- Disconnect battery negative cable
- Remove complete instrument panel



Release screws (1).

Remove speedometer (2) from radio (3).

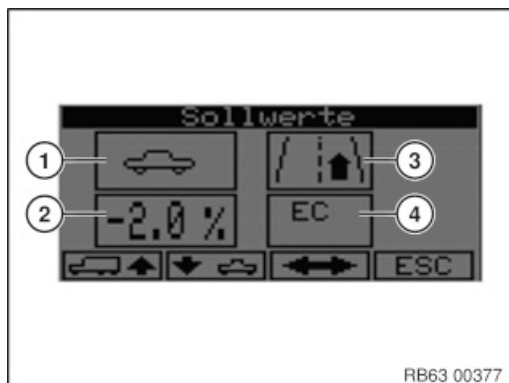


63 10 ... Adjust the fog lights (with electronic headlight adjustment device MAHA Lite 3)



Comply with test prerequisites for headlight adjustment!

Refer to the operating instructions for the headlight adjustment device!

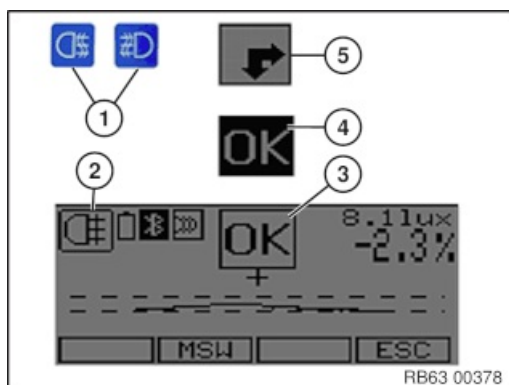


Switch on the headlight adjustment device by pressing any button. Press **F2** button. The shown display screen appears.

Perform the following settings:

1. The passenger car must be selected.
2. Enter the setting dimension for the headlight with buttons **F1/F2**:
-2,0 %
3. The right / left-hand traffic must be selected according to the country.
4. Select the fog light type with the **F3** button:
 - **EC**: for halogen fog lights
 - **EC LED**: for LED fog lights

The adjusted values are adopted for future measurements.



Press briefly the button for the applicable side of the vehicle (1) until symbol (2) appears.

The following symbols appear in the display:

- O. K. (4): Adjustment is optimal.
- O. K. (3): Adjustment is within the legal tolerance range. Adjust fog light until O. K. (4) is displayed.
- Arrows (5): Adjustment is incorrect. Adjust fog light using arrows (5) until O. K. (4) is displayed.



63 10 ... Adjust the high-beam headlight (with electronic headlight adjustment device MAHA Lite 3)



Important!

The high-beam headlight can only be adjusted in the following cases:

- The low-beam headlight and high-beam headlight are located in separate housings and each has a separate range of adjustment (e.g. E52, BMW i 01).
- Low-beam headlight and high-beam headlight are located in one housing with one separate range of adjustment each.
- With separately mounted additional headlights (e.g. MINI).

On vehicles from 1995, separate adjustment of the high-beam headlight is not possible.

(Exception E52, BMW i 01, additional headlight MINI)

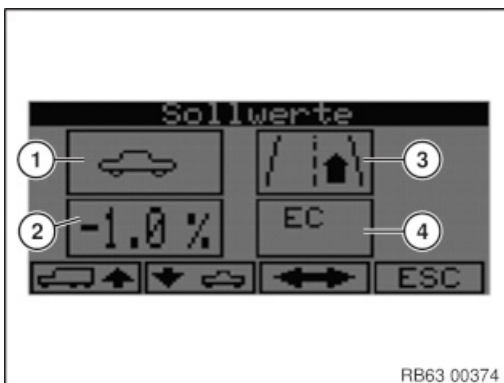


Comply with test prerequisites for headlight adjustment.

Refer to the operating instructions for the headlight adjustment device!

Necessary preliminary work:

Adjust the low-beam headlight



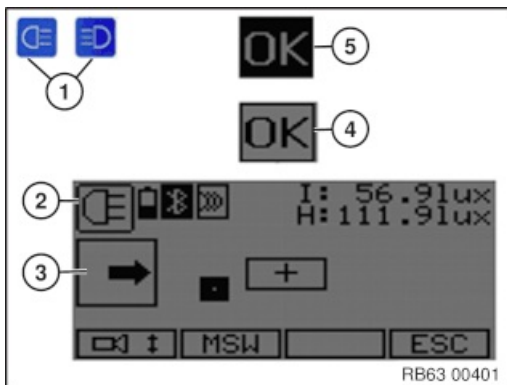
Switch on the headlight adjustment device by pressing any button.
Press **F2** button. The shown display screen appears.

Perform the following settings:

1. The passenger car must be selected.
2. Enter the setting dimension of the headlight via the buttons **F1/F2**:
-1.0 % to -1.1 %
(see "light/dark boundary of the headlight in the headlight adjustment device" in the document observe the test prerequisites for the headlight adjustment).
3. The right / left-hand traffic must be selected according to the country.
4. Select the headlight type via the button **F3**:
 - **EC**: for halogen and xenon headlights
 - **EC LED**: for LED headlight

The adjusted values are adopted for future measurements.





Press briefly the button for the applicable side of the vehicle (1) until symbol (2) appears.

The following symbols appear in the display:

- O. K. (5): Adjustment is optimal.
- O. K. (4): Adjustment is within the legal tolerance range. Adjust high-beam headlight until O. K. (5) is displayed.
- Arrows (3): Adjustment is incorrect. Adjust high-beam headlight using arrows (3) until O. K. (5) is displayed.



63 10 ... Adjust the low-beam headlight (with electronic headlight adjustment device MAHA Lite 3)



Comply with test prerequisites for headlight adjustment!

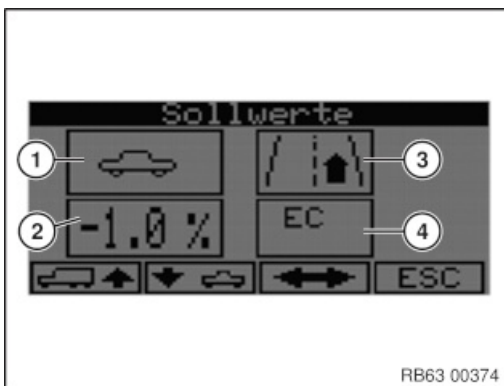
Refer to the operating instructions for the headlight adjustment device!



Note:

On vehicles with **anti-glare high-beam headlight** it is sufficient to adjust the low-beam headlight.

Only in the event of a customer complaint regarding dazzle/glare Adjust anti-glare high-beam headlight separately.



Switch on the headlight adjustment device by pressing any button.

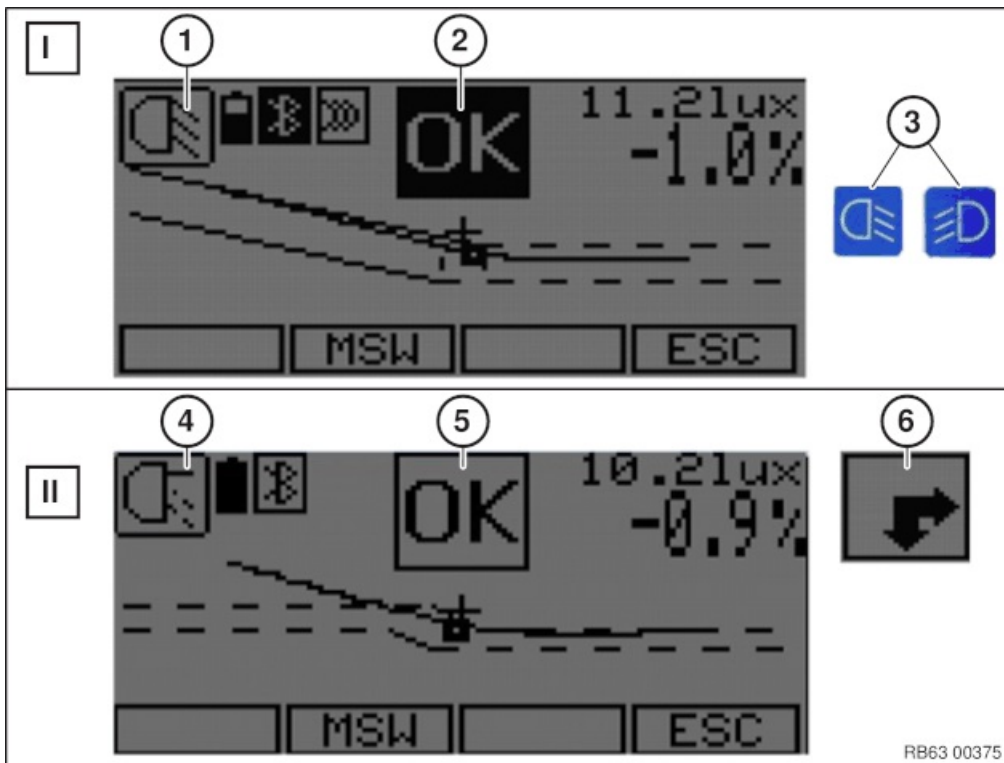
Press **F2** button. The shown display screen appears.

Perform the following settings:

1. Passenger car must be selected
2. Enter the setting dimension of the headlight via the buttons **F1/F2**:
-1,0 % to -1,1 %
(see "light/dark boundary of the headlight in the headlight adjustment device" in the document observe the test prerequisites for the headlight adjustment).
3. The right / left-hand traffic must be selected according to the country.
4. Select the headlight type via the button **F3**:
 - **EC**: for halogen and xenon headlights
 - **EC LED**: for LED headlight

The adjusted values are adopted for future measurements.





RB63 00375



Important!

Before measuring/adjusting the low-beam headlight, it is absolutely necessary to determine the transparent screen of the headlight!

An incorrect selection leads to an incorrect setting!

Transparent screen **Type I:**

Press briefly the button for the applicable side of the vehicle (3) until symbol (1) appears.

Transparent screen **Type II:**

Press longer the button for the applicable side of the vehicle (3) until symbol (4) appears.

The following symbols appear in the display:

- O. K. (2): Adjustment is optimal.
- O. K. (5): Adjustment is within the legal tolerance range. Adjust headlight until O. K. (2) is displayed.
- Arrows (6): Adjustment is incorrect. Adjust headlight using arrows (6) until O. K. (2) is displayed.

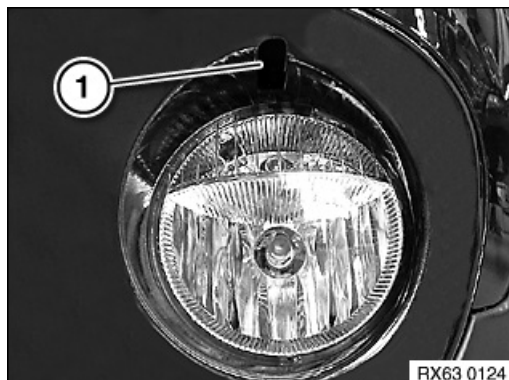


63 10 014 Adjusting fog lights



Necessary preliminary tasks:

- Observe test prerequisites for adjusting headlights

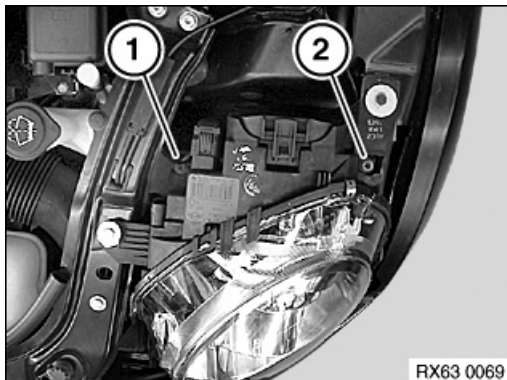


Adjust the height adjustment of the fog light using the adjusting screw (1).





Note:
Comply with test prerequisites for headlight adjustment.



Carry out headlight adjustment at adjusting screws (1) and (2).
A definite allocation of adjusting screws is not possible.

1. Adjustment screw primarily for vertical adjustment
2. Adjusting screw primarily for lateral adjustment
3. Adjust the height at the adjusting screw (1)

US version only:

Only carry out the setting of the lateral adjustment when the securing plug in the adjusting screw for the lateral adjustment is missing or is damaged.

If necessary, remove the damaged plug

After headlight adjustment:

Perform reference run. For this purpose, switch off and on the headlights. Check again headlight adjustment.

US version only:

If the lateral adjustment has been corrected, press new plugs into the adjusting screw for the lateral adjustment **without damaging it**.





The following equipment-specific and model-specific headlight types are used in BMW Group vehicles:

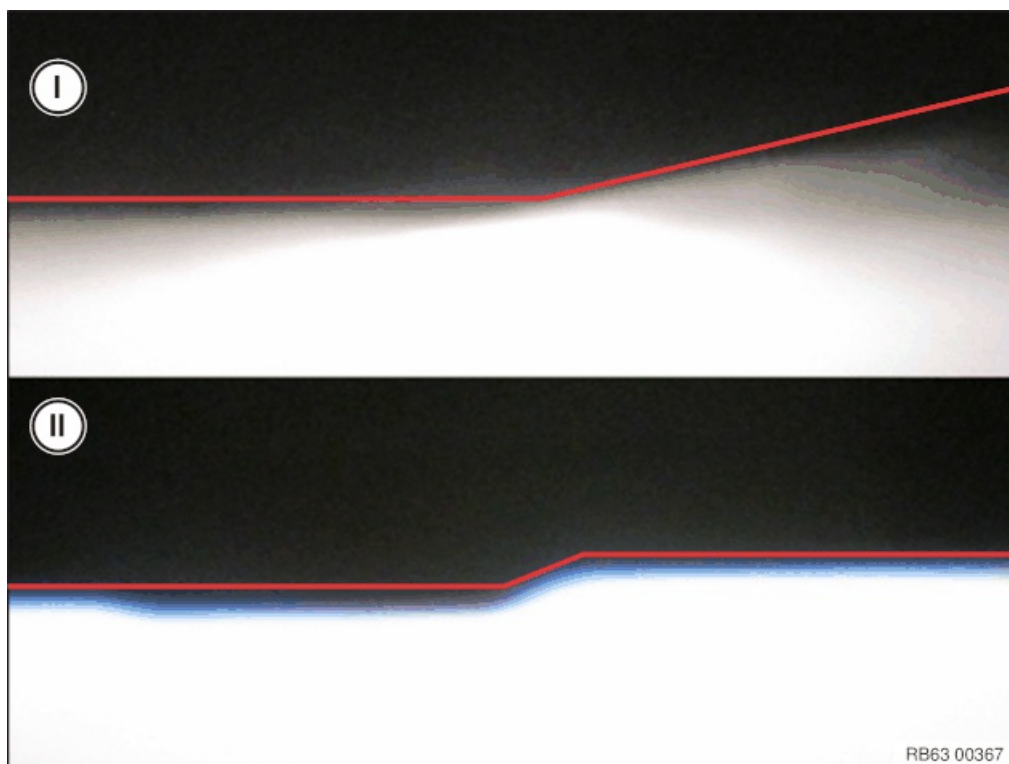
- Halogen headlights (low-beam and high-beam headlights)
- Xenon headlights (low-beam and high-beam headlights)
- LED headlights (low-beam and high-beam headlights)
- Laser headlights (high-beam headlight booster, low-beam and high-beam headlights are lit by LEDs)

Every headlight type has its specific transparent screen for the low-beam headlight. In spite of these differences, all headlight types meet statutory specifications.

The images below show transparent screens from the left headlight in the low-beam headlight switch position projected onto a wall (no automatic setting!).

The transparent screens from the right headlight are the same.

The transparent screens correspond with those in an accumulator box of a headlight adjusting device.



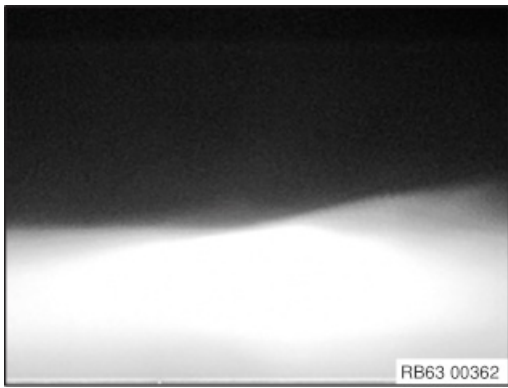
Important!

For headlight adjustment with electronic headlight adjusting devices, it is essential to determine the light pattern type!

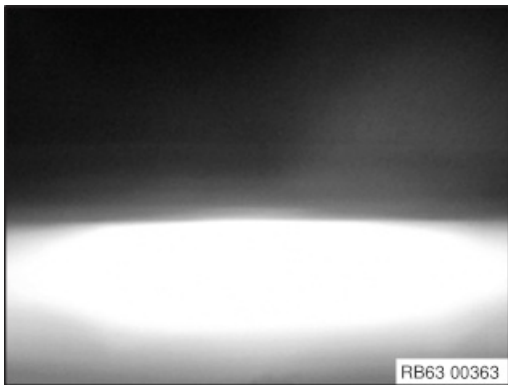
Type I: Light pattern shows a continuous increase in the light/dark boundary.

Type II: Light pattern screen shows a short increase in the light/dark boundary.

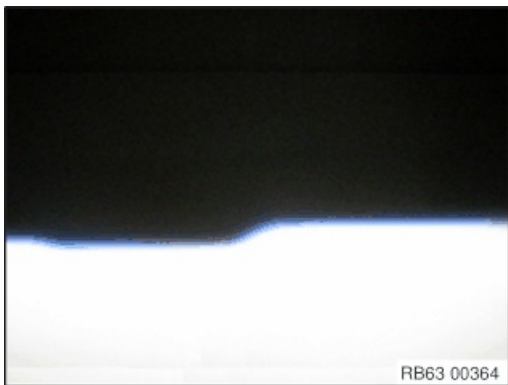




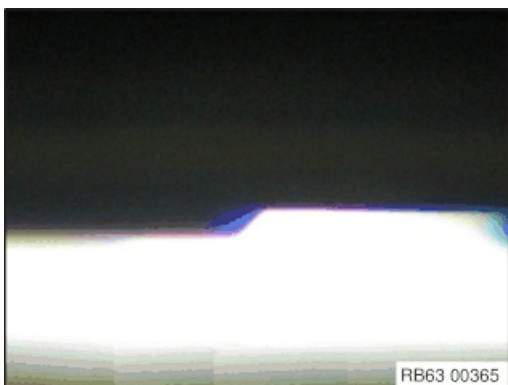
1. Halogen headlight
Type I



2. Halogen headlight **US version R60 only**

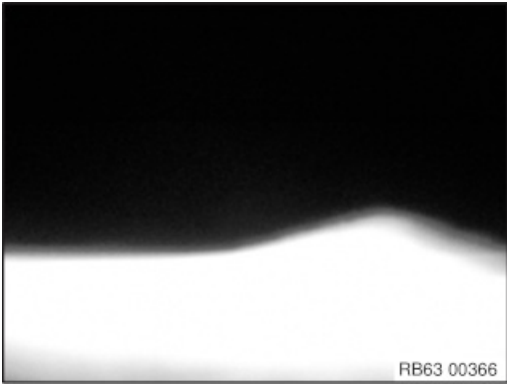


3. Xenon headlights
Type II



4. LED headlight e.g. F01, F02, F03
Type II





5. LED headlight e.g. F06, F12, F13, E71
Type I



63 10 ... Notes on headlight adjustment (overview of adjustment options of the lighting functions)

The following light-related components are used in BMW Group vehicles on an equipment-specific and model-specific basis:

Headlight types:

- Halogen headlights (low-beam and high-beam headlights)
- Xenon headlights (low-beam and high-beam headlights)
- LED headlights (low-beam and high-beam headlights)
- Laser headlights (high-beam booster)

Headlight:

- Headlight (low beam and high beam; cornering light, daytime driving lights, adaptive headlight, laser high-beam booster, dynamic marker light)
- High-beam headlight*
- Fog light (fog light, cornering light)
- Headlight dynamic marker light (dynamic marker light, no fog light)

Light functions:

<i>Lighting function</i>	<i>Setting possible</i>	<i>Setting tool</i>
Low-beam headlights	Yes	- Non-electronic headlight adjusting device - Electronic headlight adjusting device
High-beam headlight	No, Adjusted with the low-beam headlight *	
Automatic high beam (main-beam assistant)	No, Adjusted with the low-beam headlight *	
Non-dazzle high beam headlight	Yes, Adjusted with the low-beam headlight	- Non-electronic headlight adjusting device - Electronic headlight adjusting device
	Yes (with test module)	Adjustment aid for headlight
Additional laser headlight	No, Adjusted with the low-beam headlight	
Adaptive Headlight	No, Adjusted with the low-beam headlight	
Fog lights	Yes	- Non-electronic headlight adjusting device - Electronic headlight adjusting device
Dynamic marker light (to F-series)	Yes (with the test module)	- Non-electronic headlight adjusting device - Electronic headlight adjusting device Adjustment aid for headlight



Dynamic marker light (from G-series)	No, Adjusted with the low-beam headlight	
Cornering light	No	
Daytime driving lights	No	

*A setting is only possible for models with a separate housing for the high beam (E52, I01, MINI additional headlight).

Important!

All lighting functions specified above can be adjusted **both with a non-electronic as well as with an electronic headlight adjusting device.**



**Attention!**

Do not perform headlight adjustment immediately after lowering the vehicle on the vehicle hoist. In this case, move the vehicle for approx. 15 m on its own wheels before headlight adjustment.

**Attention!**

Observe the operating instructions for the headlight adjusting device!

The headlight adjusting bay must comply with the specifications as set out in StVZO (German road traffic licensing regulations) § 29 Annex 8d (or ISO 10604)!

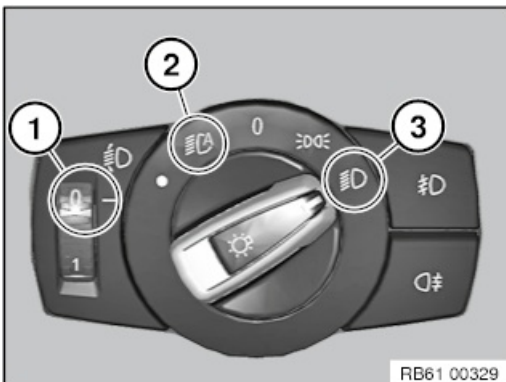
These specifications are described in "Planning principles for layout of BMW service workshops".

(Can be found in the ASAP portal, Chapter 3.2.6.1 Headlight adjusting bay)

- Park vehicle on flat and even surface.
- Replace faulty glass and mirrors and blackened light bulbs.
- Check correct adjustment of headlights in relation to engine compartment lid (gap dimensions).
- Check tyre pressure and correct if necessary.

Only halogen headlight, fog light and headlight for dynamic marker light (dynamic spotlight):

- Apply load equivalent to one person on driver's seat (approx. 75 kg).
- Vehicle with full fuel tank or appropriate additional weight in luggage compartment.



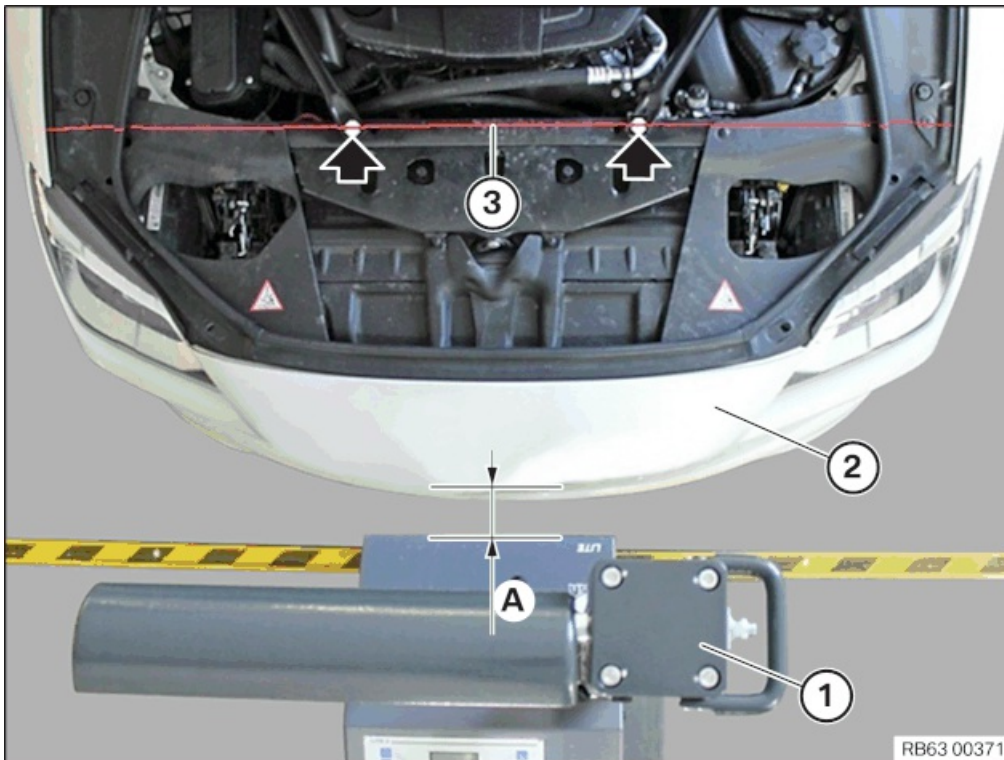
- Switch the ignition on.
- Manual headlight beam throw adjustment: Move handwheel to neutral position (1).
- **Light switch must be in "low beam/driving light" position (3).**
- Do not carry out the headlight adjustment in the "automatic driving lights control" light switch position (2).
- Version with Xenon or LED (automatic headlight beam throw adjustment): Wait 80 s after switching on lights. During this time, do not move the vehicle and avoid vibrations.

**Attention!**

Do not move the vehicle and steering wheel during the measuring and adjustment procedures!

Wheels must be in the straight-ahead position!



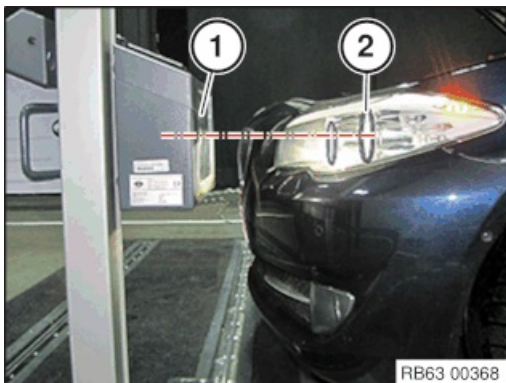


Attention!
 A correct measurement/adjustment requires exact positioning of the headlight adjusting device (1)!
 The headlight adjusting device (1) must stand vertically to the vehicle longitudinal axis!
 This applies to all headlights!

Position the headlight adjusting device (1) centrally in front of the vehicle (2) at distance (A) = **10 cm**.
 Align the headlight adjusting device (1) by laser beam (3). Laser beam (3) must hit two suitable points, e.g. marked by arrows.

Attention!
 Points must be vehicle proof!
 Points must be separated as wide as possible!
 Trim panels are not suitable!

If the headlight adjusting device (1) does not have a laser beam (3), complete the alignment analogous with the line in the mirror.

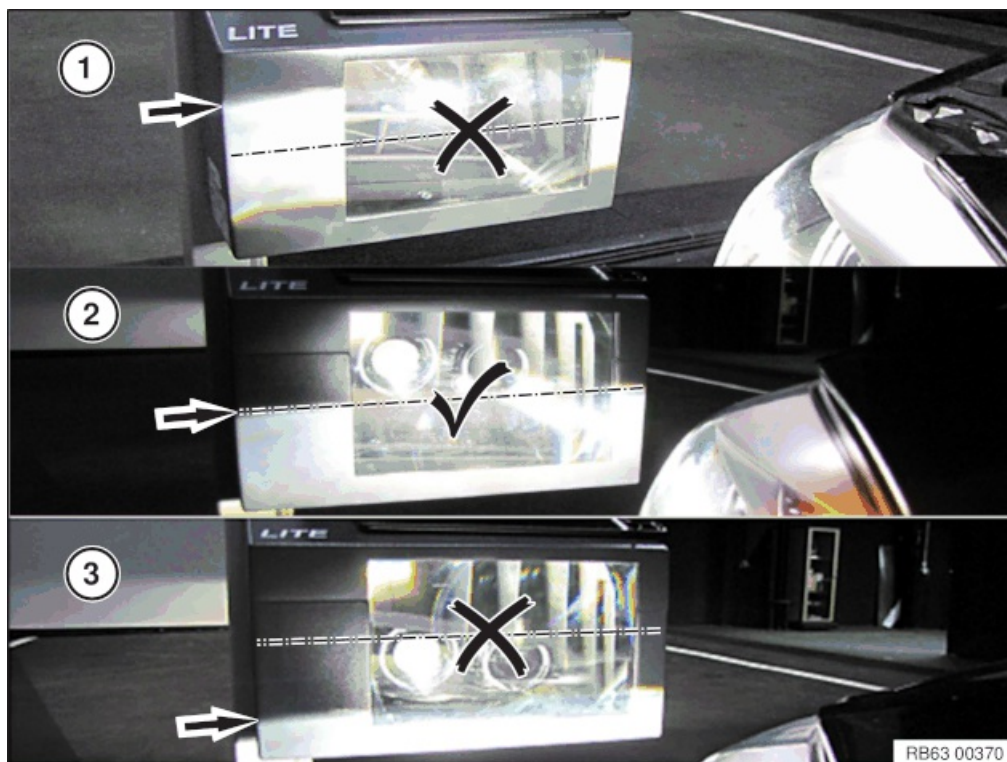


Attention!
 Always perform positioning of the headlight adjusting device (1) at the outer headlight (2)!

The centre of the collecting lens (1) must match the centre of headlight (2) horizontally.

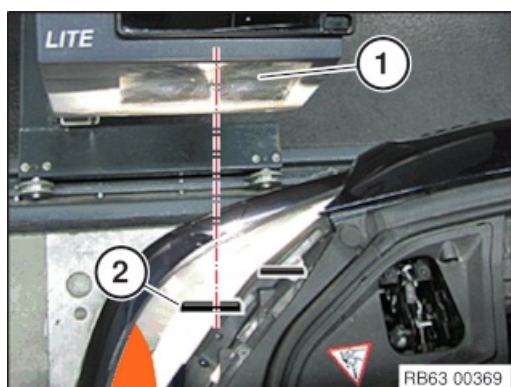
Corrections are made by raising or lowering the headlight adjusting device.





When positioned correctly, the light/dark boundary of the headlight (marked with arrow) must hit the collecting lens of the adjusting device in the centre:

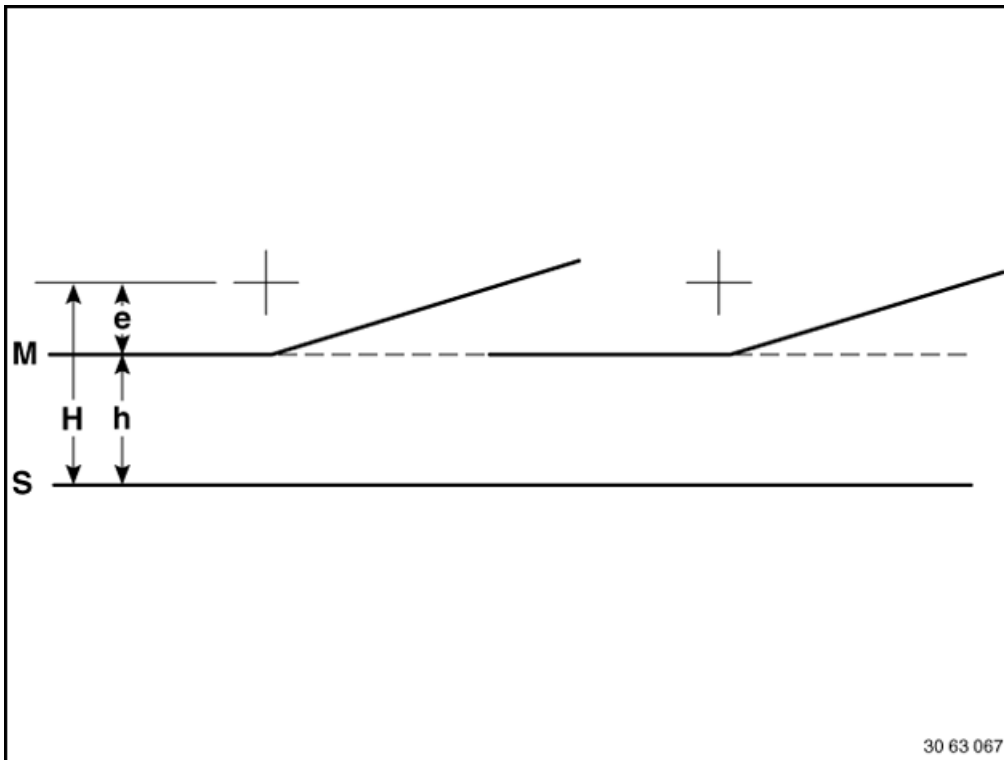
1. The headlight adjusting device is too low.
2. The headlight adjusting device is positioned correctly.
3. The headlight adjusting device is too high.



The centre of the collecting lens (1) must match the centre of headlight (2) vertically.

Corrections are made by sliding the side of the headlight adjusting device to the left or right.





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Note:

The figure shows an example for the transparent screen of halogen headlights.
Overview of transparent screens of different headlight types.

Set the marker line {M} on the headlight adjusting device to dimension {e}. Scale graduations on the headlight adjusting device are equal to a gradient in cm at a distance of 10 metres.

Light/dark boundary of headlights in headlight adjusting device

{e} Setting dimension, headlights:

- Value is indicated on the **headlight housing** and on vehicles with production date up to 2011 on the **type plate** in %.
(e.g.: **1.0 %** = -10 cm/10 m = **- 1.0 %** on the headlight adjusting device)
- Value **1.0 %** (adjustment value **- 1.0 %**) applies to all BMW Group vehicles.
- Exception: E53, E70, E71, E72, E83, F15, F16, F25, F26, R60, R61, F60. For these vehicles, value **1.1%** (adjustment value **- 1.1%**) applies.

Setting dimension, fog lights:

- Value **2.0%** = -20 cm/10 m = **- 2.0%** on the headlight adjustment device applies to all BMW Group vehicles.

{H} Height of headlight centre above parking surface

{h} {H} - {e} = height of marking line above parking surface

+ Central mark = centre point of high beam headlight.

{M} Marker line of the headlight adjusting device

{S} Standing surface of the vehicle and headlight adjusting device

Adjustment dimension {e} is only valid for EUR. Observe differing national regulations.



63 12 ... Repairing headlights

It is possible to repair the following damage:

- Deformed or broken holders can be replaced using the available repair kits.
Replacement of headlight is **not required**!
For reasons of pedestrian safety it is **not permitted** to use adhesive or reinforcements to repair broken holders!

Note:

Headlight repair kits are not available for every vehicles (see Electronic Parts Catalogue).

Follow the vehicle-specific repair instructions.

It is not possible to repair the following damage:

- Deformed or broken headlight housing.
- Scratched or damaged headlight lenses
The standard coating of headlight lens cannot be restored. Commercially available repair systems are unable to provide sufficient protection from ultraviolet radiation and external influences (stone chipping).



63 12 ... Headlight fogging fault pattern



Note:

Certain weather conditions can lead to fogging on the inside of the headlight lens.

This is not necessarily a fault that requires replacement of the headlight.



Top row (A): Permissible fogging. **Headlight does not need to be replaced.**

Bottom row (B): Impermissible fogging. Replace the headlight.



**Important!****Risk of damage!**

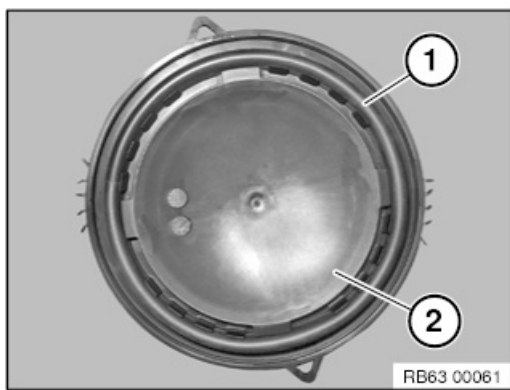
Damaged seals on the protective caps will lead to moisture penetration into the headlight.

This will in turn cause porous cable insulations and malfunctioning of the headlight.



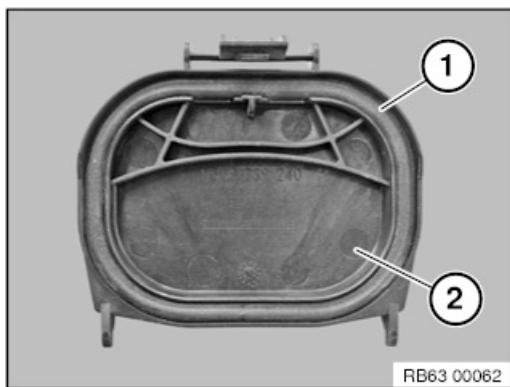
When working on the headlight system, check the protective cap seals.

Replace the protective cap in the event of damage!



Example: screwed protective cap

Seal (1) on protective cap (2).



Example: latchable protective cap

Seal (1) on protective cap (2).



**Warning!**

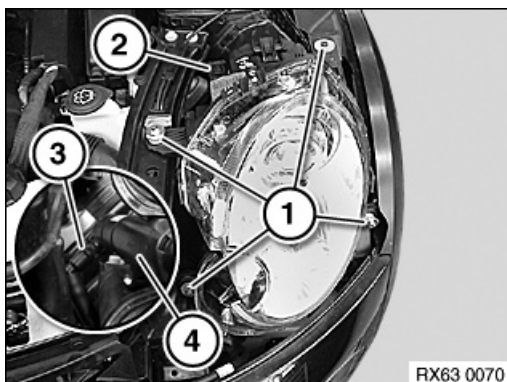
Version with xenon headlights: Danger to life due to high voltage!
Therefore, before removing, disconnect all components from the power supply (lighting system and ignition off).

Work on the entire xenon lighting system (ignition device, control unit and bulb) may only be carried out by qualified personnel.

Follow notes for handling light bulbs (exterior lights).

**Attention!**

Read and comply with notes on protection against electrostatic damage (ESD protection).

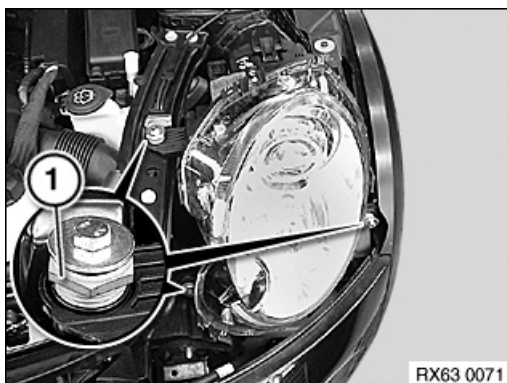


Release screws (1). Tightening torque 63 12 1AZ .

Disconnect plug connection (2).

Pull the headlight forwards slightly and disconnect the hose connection (3) from the high-pressure nozzle (4).

Remove the headlight.

*Installation note:*

Adjust gap dimensions by means of adjusting screws (1)

Adjust headlights

**Replacement:**

- Modify xenon bulb for headlights
- Modify bulb for turn indicator
- Modify control unit for xenon headlights
- Modify high-pressure nozzle of headlight cleaning system
- Modify adjusting screws
- **US version:** Checking blocking at horizontal position





Warning!

Version with xenon headlights: Danger to life due to high voltage!
Therefore, before removing, disconnect all components from the power supply (lighting system and ignition off).

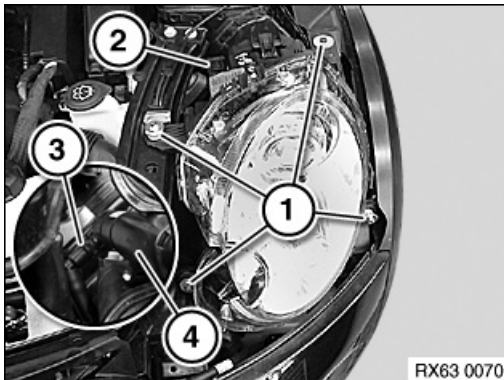
Work on the entire xenon lighting system (ignition device, control unit and bulb) may only be carried out by qualified personnel.

Follow notes for handling light bulbs (exterior lights).



Attention!

Read and comply with notes on protection against electrostatic damage (ESD protection).

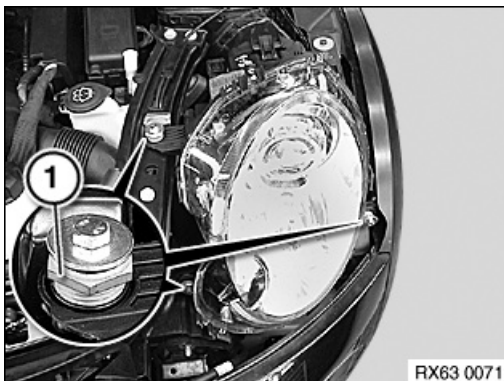


Release screws (1). Tightening torque 63 12 1AZ.

Disconnect plug connection (2).

Pull the headlight forwards slightly and disconnect the hose connection (3) from the high-pressure nozzle (4).

Remove the headlight.



Installation note:

Adjust gap dimensions by means of adjusting screws (1)

Adjust headlights



Replacement:

- Modify xenon bulb for headlights
- Modify bulb for turn indicator
- Modify control unit for xenon headlights
- Modify powertrain/electronics box for Adaptive Headlight
- Modify high-pressure nozzle of headlight cleaning system
- Modify adjusting screws
- **US version:** Checking blocking at horizontal position



**63 12 017
Headlight)**

Removing and installing (replacing) right headlight (Adaptive



Operation is described in:

Remove left headlight (Adaptive Headlight)



63 12 012

Removing and installing (replacing) the right headlight (Xenon)



Operation is described in:

Removing and installing left xenon headlight



63 12 007 headlight)

Removing and installing/replacing left or right headlight (halogen



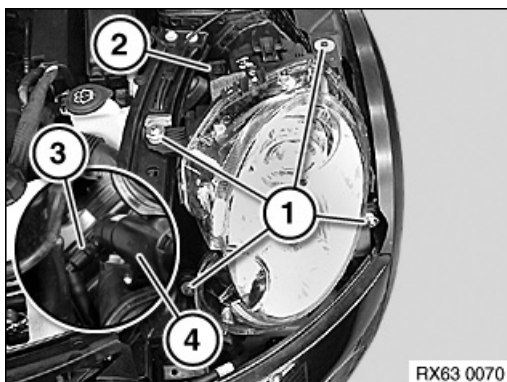
Warning!

Follow notes for handling light bulbs (exterior lights).



Attention!

Read and comply with notes on protection against electrostatic damage (ESD protection).



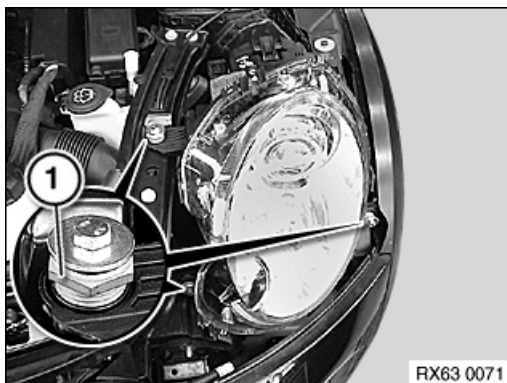
Release screws (1). Tightening torque 63 12 1AZ.

Disconnect plug connection (2).

Version with headlight cleaning system:

Pull the headlight forwards slightly and disconnect the hose connection (3) from the high-pressure nozzle (4).

Remove the headlight.



Installation note:

Adjust gap dimensions by means of adjusting screws (1)

Adjust headlights



Replacement:

- **US version:** Checking blocking at horizontal position
- Retrofit halogen bulb in headlights
- Retrofit halogen bulb in high beam headlights
- Modify bulb for turn indicator
- If necessary, modify high-pressure nozzle of headlight cleaning system
- Modify adjusting screws



63 12 ... Repairing headlights

It is possible to repair the following damage:

- Deformed or broken holders can be replaced using the available repair kits.
Replacement of headlight is **not required**!
For reasons of pedestrian safety it is **not permitted** to use adhesive or reinforcements to repair broken holders!

Note:

Headlight repair kits are not available for every vehicles (see Electronic Parts Catalogue).

Follow the vehicle-specific repair instructions.

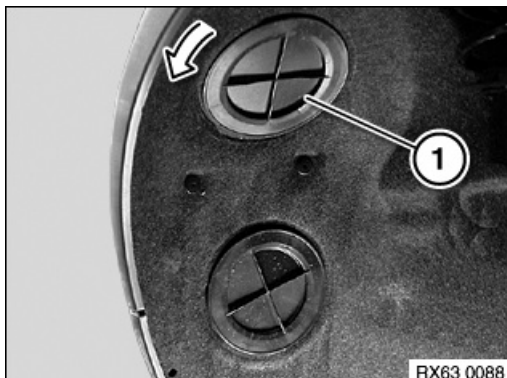
It is not possible to repair the following damage:

- Deformed or broken headlight housing.
- Scratched or damaged headlight lenses
The standard coating of headlight lens cannot be restored. Commercially available repair systems are unable to provide sufficient protection from ultraviolet radiation and external influences (stone chipping).



**Warning!**

Follow instructions for handling light bulbs (exterior lights).

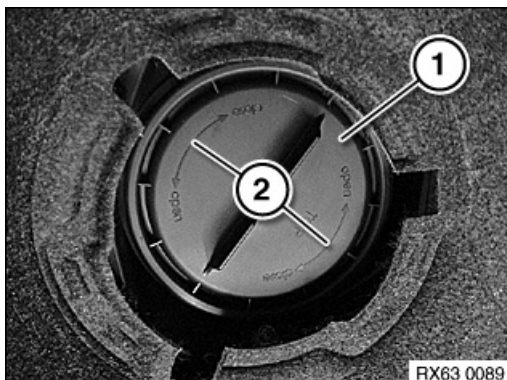


Turn cover (1) in direction of arrow and remove. *Note:*
left side:

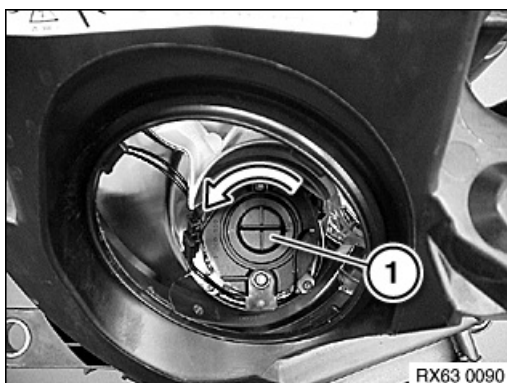
Turn cover (1) counter-clockwise

right side:

Turn cover (1) clockwise

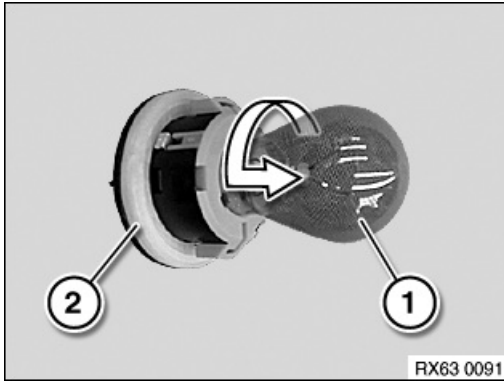


Turn the cover (1) in direction of arrow (2) and remove.



Turn bulb holder (1) counter-clockwise and pull out.





Turn bulb for front turn indicator (1) counter-clockwise and remove from bulb holder (2). *Installation note:*
Note bulb type.



**Warning!**

Version with xenon headlights: Danger to life due to high voltage!
Therefore, before removing, disconnect all components from the power supply (lighting system and ignition off).

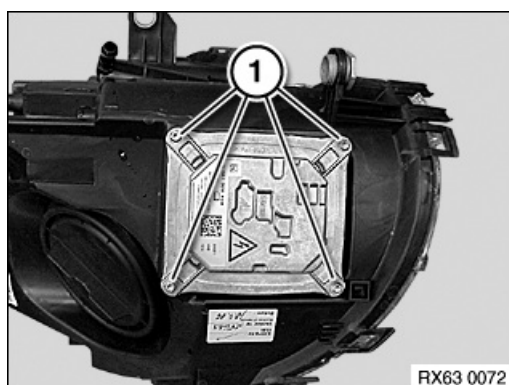
Work on the entire xenon lighting system (control unit, ignition unit with bulb) may only be carried out by specialist personnel.

**Important!**

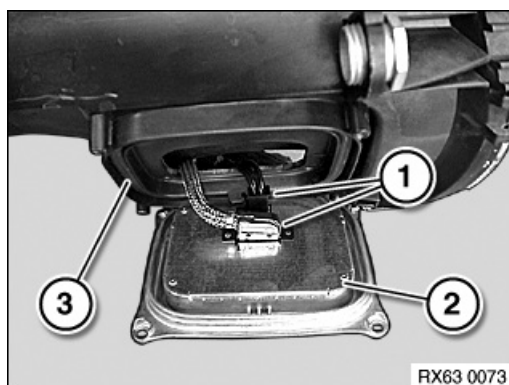
Read and comply with notes on protection against electrostatic damage (ESD protection).

**Necessary preliminary tasks:**

- Remove headlight



Release screws (1) and fold down the control unit. Tightening torque 63 12 2AZ.



Disconnect plug connection (1) and remove control unit (2).

Installation note:

Make sure the sealing cup (3) is correctly seated on the xenon headlight.



63 12 861

Replacing control unit for right xenon headlight



Operation is described in:

Replace control unit for left xenon headlight.



**Warning!**

Version with xenon headlights: Danger to life due to high voltage!
Therefore, before removing, disconnect all components from the voltage supply (lighting system and ignition off).

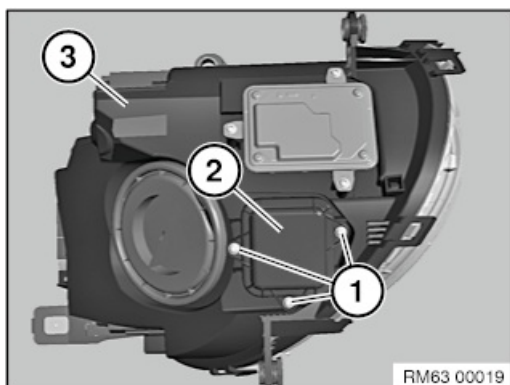
Work on the entire xenon lighting system (control unit, ignition unit with bulb) may only be carried out by specialist personnel.

**Important!**

Read and comply with notes on protection against electrostatic damage (ESD protection).

**Necessary preliminary tasks:**

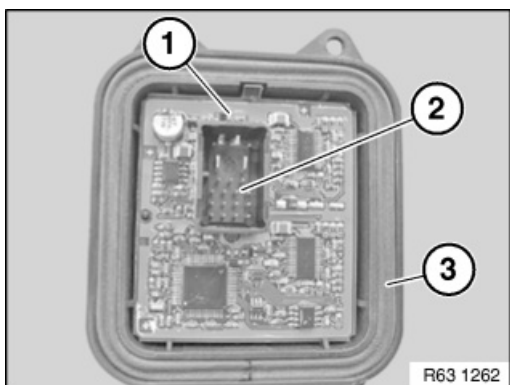
- Remove headlight



Release screws (1) and remove protective cap (2) from headlight (3).

Electronics box/control unit is locked in protective cap (2).

Tightening torque 63 12 4AZ.

**Note:**

Graphic similar

Installation note:

Make sure electronics box/control unit (1) is correctly seated in protective cap (2).

Pin housing (2) and gasket (3) must not be damaged.



Carry out vehicle programming/encoding.



**63 12 896
headlight**

Replacing electronics box/control unit for right adaptive



Operation is described in:

Replacing electronics box/control unit for left Adaptive Headlight.



**Warning!**

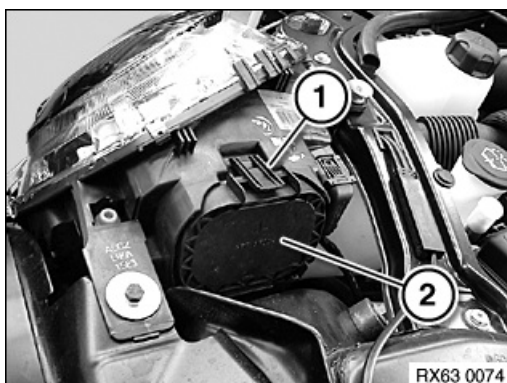
Version with xenon headlights: Danger to life due to high voltage!
Therefore, before removing, disconnect all components from the voltage supply (lighting system and ignition off).

Work on the entire xenon lighting system (control unit, ignition unit with bulb) may only be carried out by qualified personnel.

Follow instructions for handling light bulbs (exterior lights).

**Important!**

Ignition unit and xenon bulb are viewed as a single component and must not be separated.



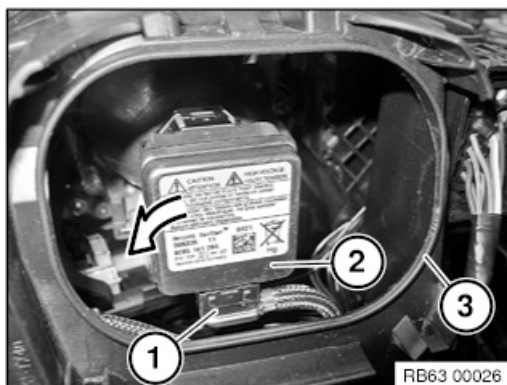
Unlock retaining tab (1) and remove protective cap (2) from headlight. *Installation note:*

Protective cap (2) must be correctly engaged.

Check seal.

Replace protective cap (2) if necessary.

Comply with Instructions for replacing the protective cap.



Disconnect plug connection (1).

Turn ignition unit for xenon headlight (2) in direction of arrow and remove from headlight (3).

Installation note:

Make sure ignition unit (3) is exactly seated in headlight.

**Recommendation:**

Check headlight adjustment, correct if necessary.



63 12 871

Replacing right ignition unit for right xenon headlight



Operation is described in:

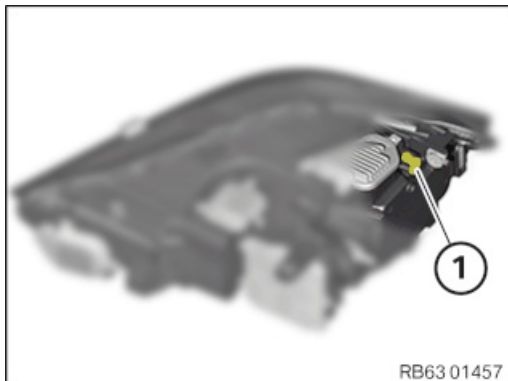
Replacing ignition unit for left xenon headlight



63 12 ... US version: Check / position the horizontal blocking when headlight is replaced

Note:

Before installing the new headlamp, make sure that the headlamp adjustment screw for lateral adjustment is secured against tampering with a plug.

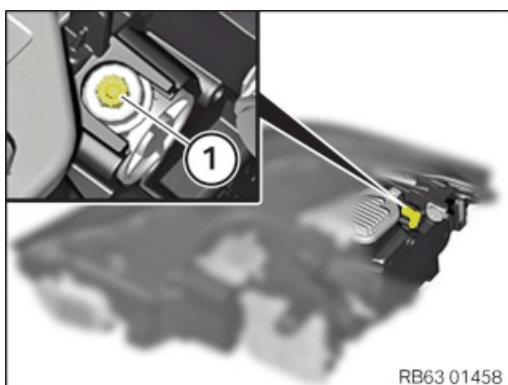


Check:

Check the adjustment screw for horizontal adjustment for blocking (schematic diagram) For the precise location of the adjusting screws, if necessary, refer to the vehicle-specific documents for the headlamp setting)

Desired state:

The adjustment screw for side adjustment must be blocked with a plug (1) (schematic diagram)



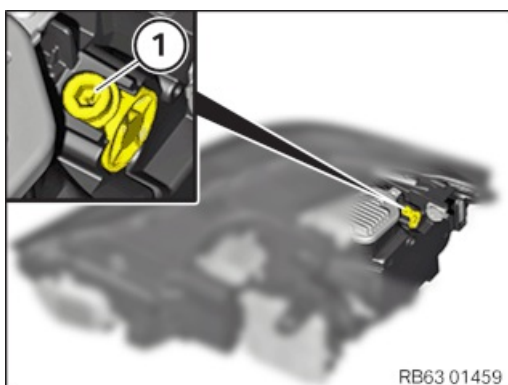
Result:

Plug (1) is mounted in the the horizontal adjustment screw (schematic diagram))

Measure:

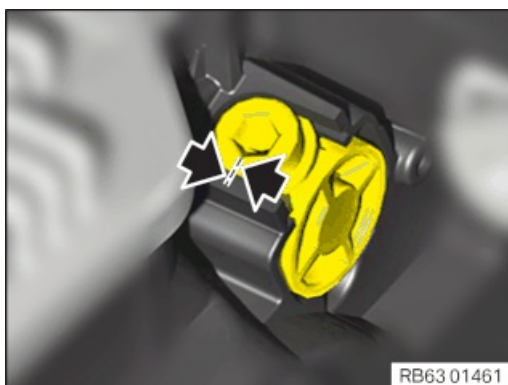
Install headlight

After installation, check **vertical** headlamp setting and correct if necessary



Result:

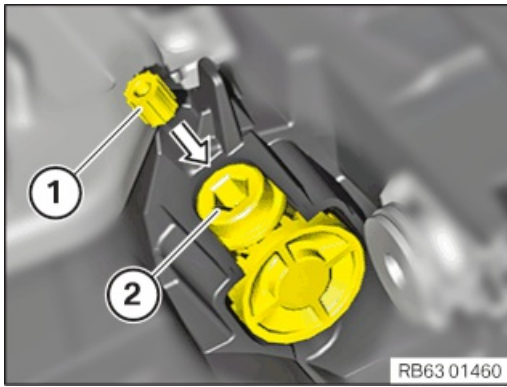
No plug is fitted in the horizontal adjustment screw (1) (schematic diagram)



Measure:

Mark the position of the horizontal adjustment screw to identify a possible adjustment of the adjustment screw after mounting the horizontal lock (schematic diagram).





Insert the headlamp-specific plug (1) **into the adjustment screw (2) without damage** (schematic diagram)

Attention: After installing the plug (1), check the correct position of the adjustment screw (2) according to the markings applied and correct if necessary.

Install headlight

After installation, check **vertical** headlamp setting and correct if necessary

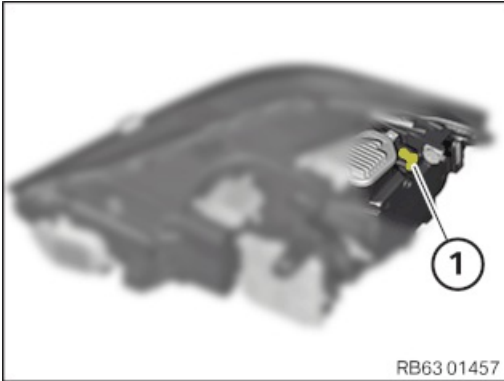


63 12 ... US version: Remove the horizontal blocking before adjusting the headlamp



Special tools required:

- 23 0 490

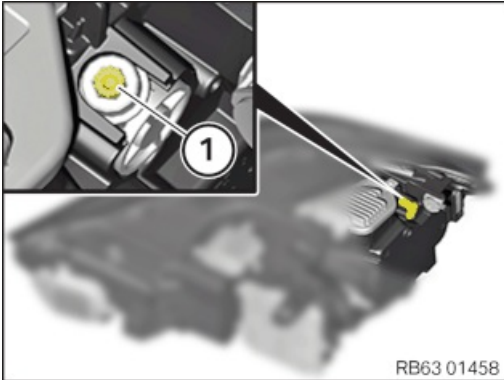


Check:

Check the adjustment screw for horizontal adjustment for blocking (schematic diagram) For the precise location of the adjusting screws, if necessary, refer to the vehicle-specific documents for the headlamp setting)

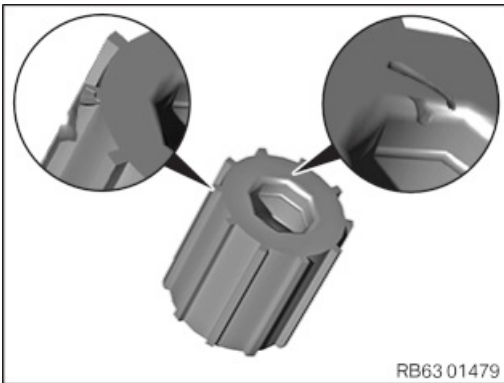
Desired state:

The adjustment screw for side adjustment must be blocked with a plug (1) (schematic diagram)



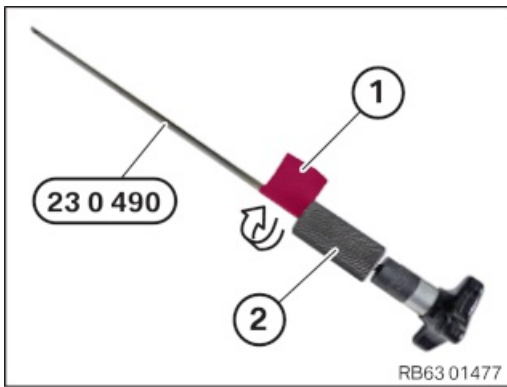
Result:

Plug (1) is mounted in the the horizontal adjustment screw (schematic diagram))



Plug (1) has **damage / deformation on ribs / bore**, which suggest possible manipulation of the headlamp setting

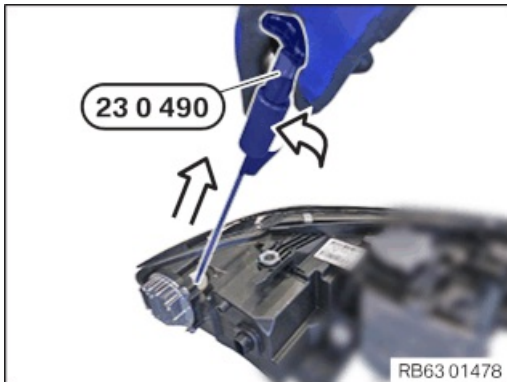




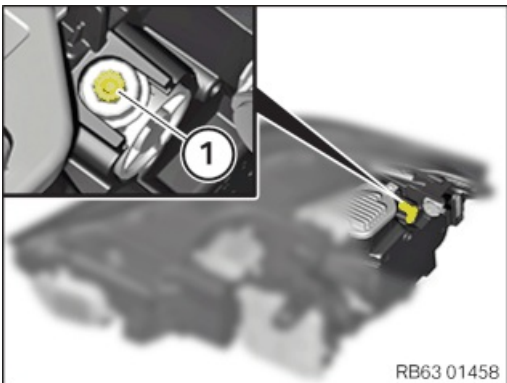
Measure:

Remove blockage from horizontal adjustment screw

In order to prevent damage to the vehicle, the impact weight (2) of the special tool 23 0 490 must be fixed close to the handle with adhesive tape (1).



Screw special tools 23 0 490 into plugs and remove them from the adjusting screw by pulling (schematic diagram)



Result:

Plug (1) is mounted in the horizontal adjustment screw and has no **damage / deformation** suggesting possible manipulation of the headlamp setting (schematic diagram)

Measure:

No check or adjustment of the horizontal adjustment necessary





Special tools required:

- 2 467 369

Note:

Before installing the new headlamp, make sure that the headlamp adjustment screw for horizontal adjustment is secured against tampering with a plug.



Special tool 2 467 369 has a freewheel for damage-free, torque-free installation of the horizontal blocking



Carefully insert the plug (1) for blocking the horizontal adjustment onto the special tool 2 467 369, free of damage



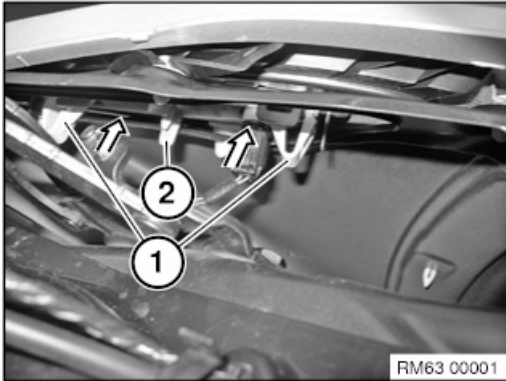
Press in the plug (1) with the special tool 2 467 369 **damage-free** into the adjustment screw for horizontal adjustment (2) (schematic diagram)



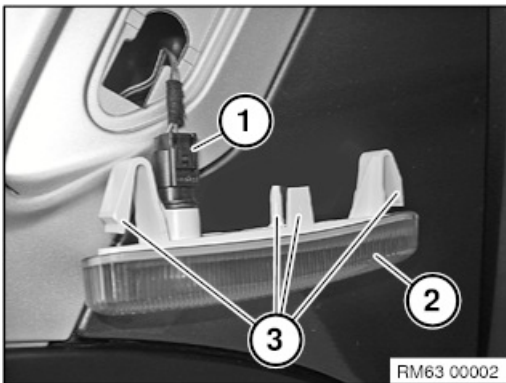


Necessary preliminary tasks:

- Unlock and open engine compartment lid



Unlock retaining lug (1) and press side repeater (2) in direction of arrow.



Unfasten plug connection (1) and disconnect.

Remove side repeater (2).

Installation note:

Latch mechanisms and guides (3) must not be damaged or missing.

Make sure that side repeater (2) is correctly locked.

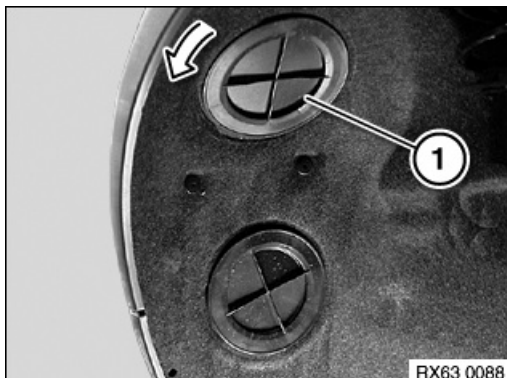
Replacement:

- If necessary, convert bulb.



**Warning!**

Follow instructions for handling light bulbs (exterior lights).

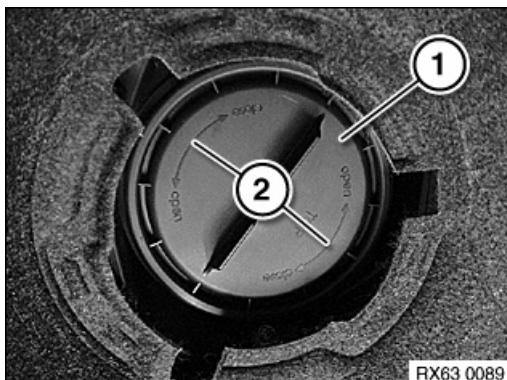


Turn cover (1) in direction of arrow and remove. *Note:*
left side:

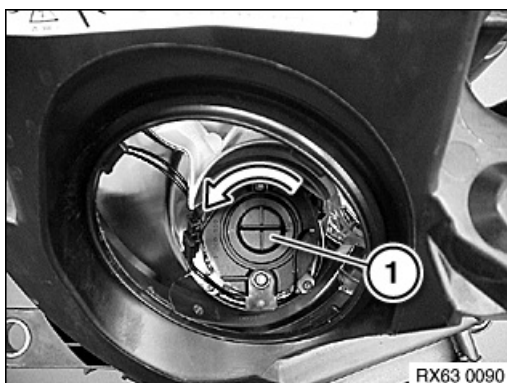
Turn cover (1) counter-clockwise

right side:

Turn cover (1) clockwise

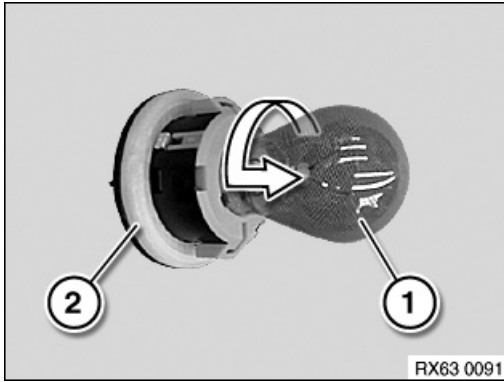


Turn the cover (1) in direction of arrow (2) and remove.



Turn bulb holder (1) counter-clockwise and pull out.





Turn bulb for front turn indicator (1) counter-clockwise and remove from bulb holder (2). *Installation note:*
Note bulb type.

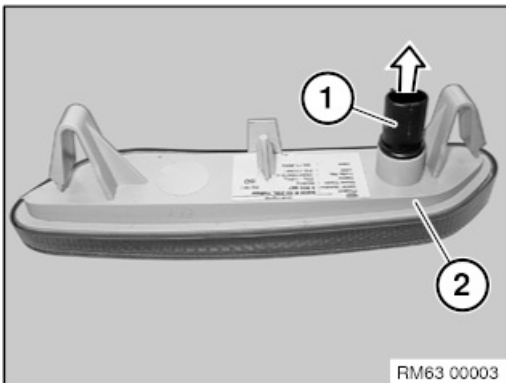


**Warning!**

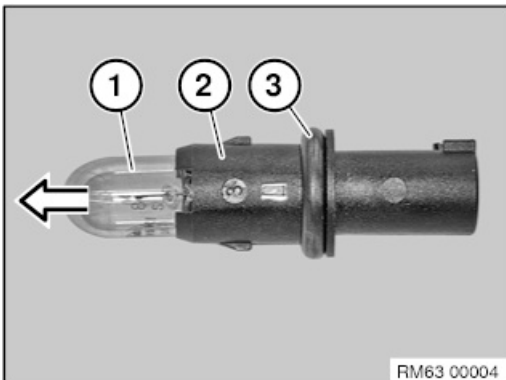
Follow instructions for handling light bulbs (exterior lights).

**Necessary preliminary tasks:**

- Remove side repeater on front left or right



Turn bulb holder (1) to the left and remove from front side repeater (2) in direction of arrow.



Pull bulb for side repeater (1) out of bulb holder (2).

Installation note:

Make sure sealing ring (3) is correctly seated on bulb holder (2)

Note bulb type.



63 14 020 light

Removing and installing/replacing front left or right side marker



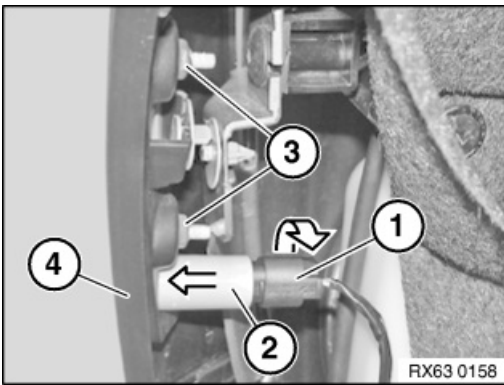
Warning!

Follow instructions for handling light bulbs (exterior lights).



Necessary preliminary tasks:

- Partially remove the front wheel arch cover



Turn bulb holder (1) in direction of arrow and pull out of side marker light (2).

Unscrew nuts (3).

Remove side marker light (2) in direction of arrow from cover on wheel arch (4).

Installation note:

Ensure sealing ring is correctly fitted on bulb holder (1).

Make sure bulb holder (1) is correctly latched on side marker light (2).





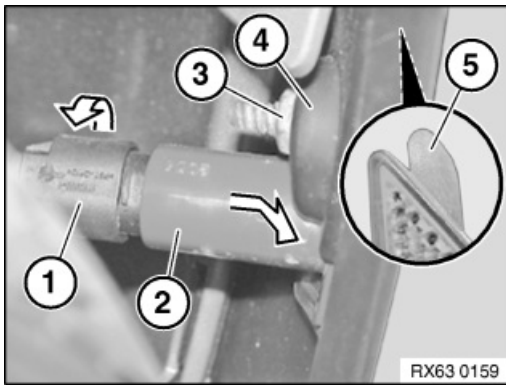
Warning!

Follow instructions for handling light bulbs (exterior lights).



Necessary preliminary tasks:

- Partially remove the rear wheel arch cover



Turn bulb holder (1) in direction of arrow and pull out of side marker light (2).

Unscrew nut (3).

Remove side marker light (2) in direction of arrow from cover on wheel arch (4).

Installation note:

Journal (5) of the side marker light (2) must first be inserted in cover on wheel arch (4).

Ensure sealing ring is correctly fitted on bulb holder (1).

Make sure bulb holder (1) is correctly latched on side marker light (2).



63 17 070 Removing and installing/replacing left fog light (with headlight cleaning system)



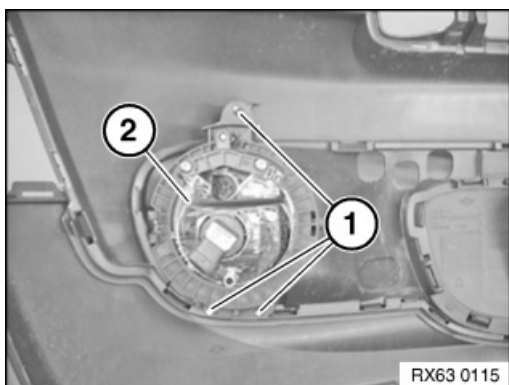
Warning!

Follow notes for handling light bulbs (exterior lights).



Necessary preliminary tasks:

- Remove front bumper panel



Release screws (1) and remove fog light (2).



On replacement of fog light or bumper panel at front:

- If necessary, remount bulb
- Adjust fog lights

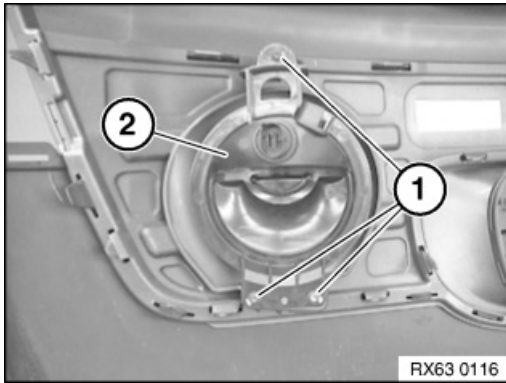


63 17 090 Removing and installing/replacing left position light (with headlight cleaning system)



Necessary preliminary tasks:

- Remove front bumper panel



Release screws (12) and remove position light (2).

Replacement:

- If necessary, remove bulb.

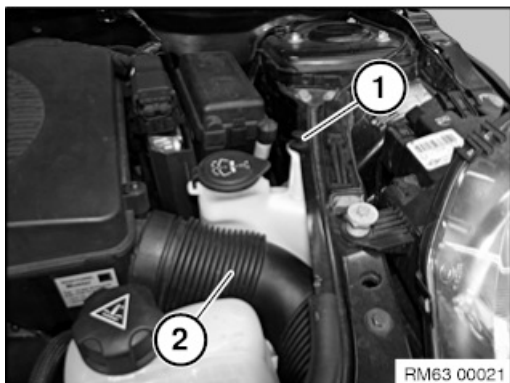


63 17 088 Removing and installing/replacing left position light (without headlight cleaning system)

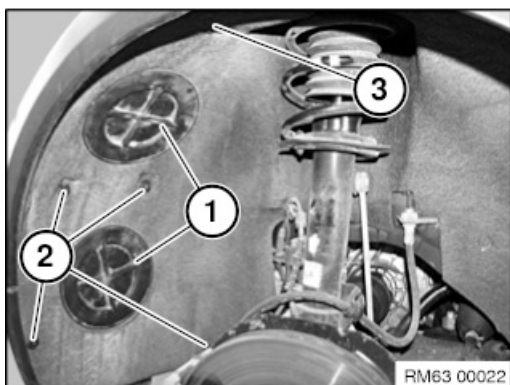


Necessary preliminary tasks:

- Remove front wheel



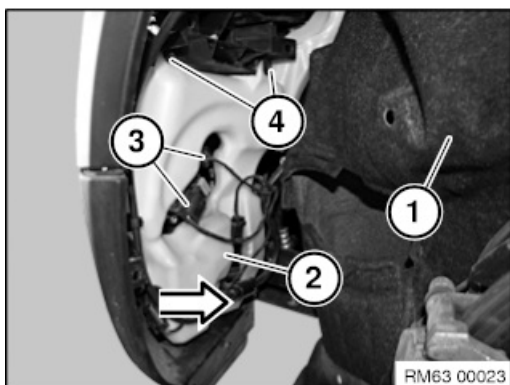
Release expanding rivet (1) and air hose (2).



Remove lid (1).

Release expanding rivet (2).

Release screw (3).



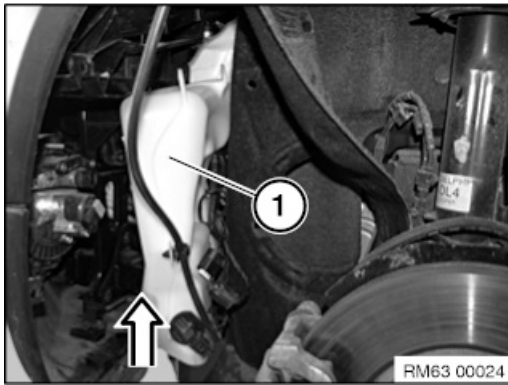
Fold wheel arch panel (1) towards rear and fasten.

Disconnect connector (3).

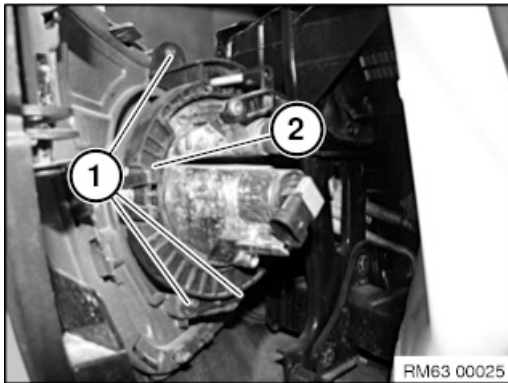
Release screws (4).

Lever out washer fluid reservoir (2) and turn in direction of arrow into wheel arch.





Press washer fluid reservoir (1) to the top.



Note:
Similar to graphic.

Release screws (1).

Feed out position light (2) to one side.

Replacement:

If necessary, remove bulbs.

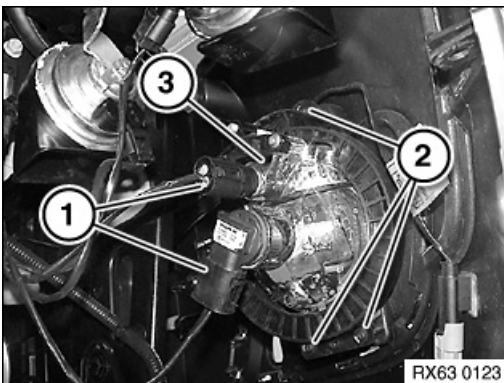


**Warning!**

Follow instructions for handling light bulbs (exterior lights).

**Necessary preliminary tasks:**

- Partially detach front wheel arch liner
- Release fanfare



Disconnect plug connection (1).

Release screws (2) and remove fog light insert (3).

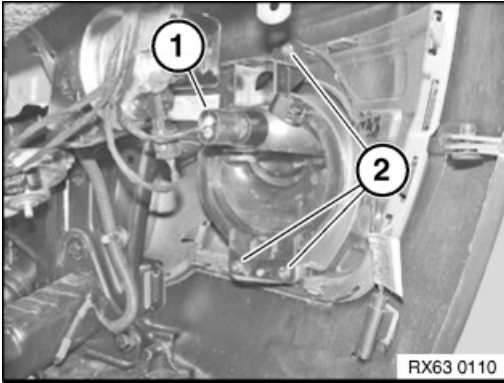
**On replacement of fog light or bumper panel at front:**

- If necessary, remount bulb
- Adjust fog lights



**Necessary preliminary tasks:**

- Partially detach front wheel arch panel
- Release fanfare



Disconnect plug connection (1).

Release screws (2) and remove position light.

Replacement:

- If necessary, remove bulb.



63 17 068 Removing and installing/replacing the fog light (without headlight cleaning system)



Warning!

Follow instructions for handling light bulbs (exterior lights).

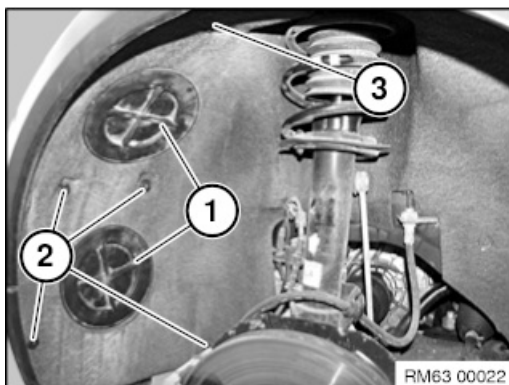


Necessary preliminary tasks:

- Remove front wheel



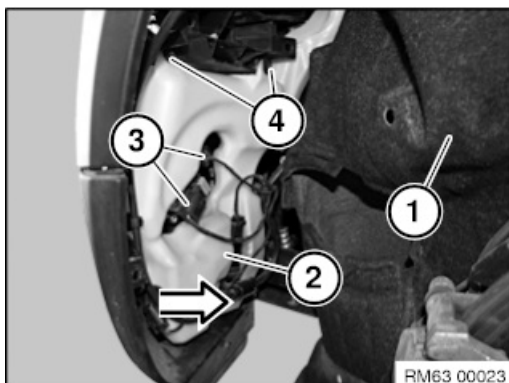
Release expanding rivet (1) and air hose (2).



Remove lid (1).

Release expanding rivet (2).

Release screw (3).



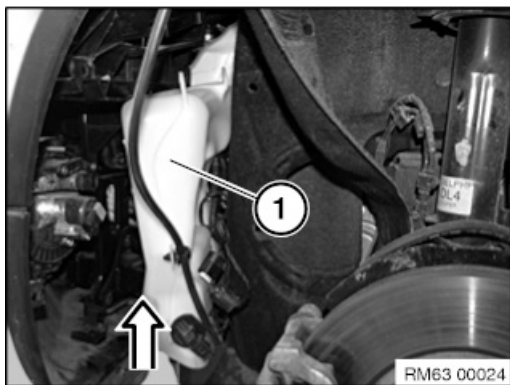
Fold wheel arch panel (1) towards rear and fasten.

Disconnect connector (3).

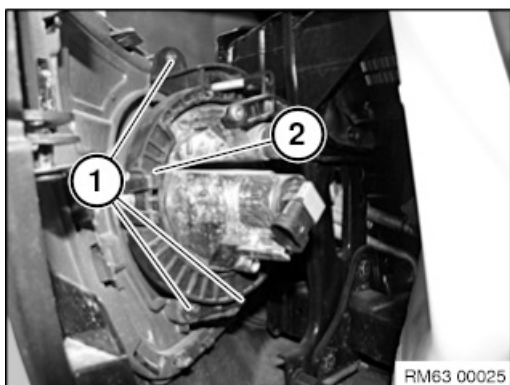
Release screws (4).

Lever out washer fluid reservoir (2) and turn in direction of arrow into wheel arch.





Press washer fluid reservoir (1) to the top.



Release screws (1).

Feed out fog lights (2) toward side.



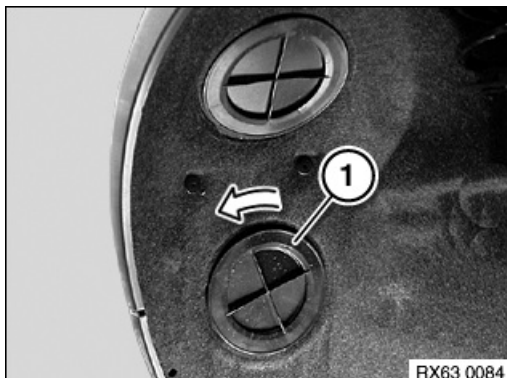
On replacement of fog light or bumper panel at front:

- If necessary, remount bulb
- Adjust fog lights



**Warning!**

Follow instructions for handling light bulbs (exterior lights).

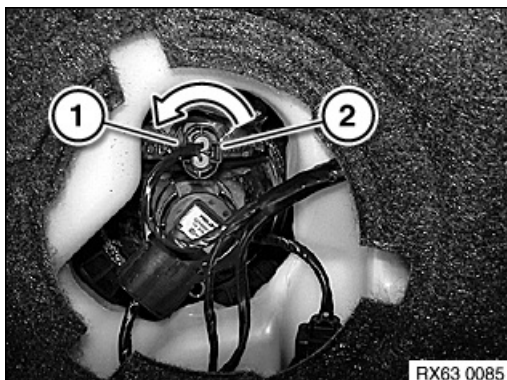


Twist cover (1) in direction of arrow and remove. *Note:*
left side:

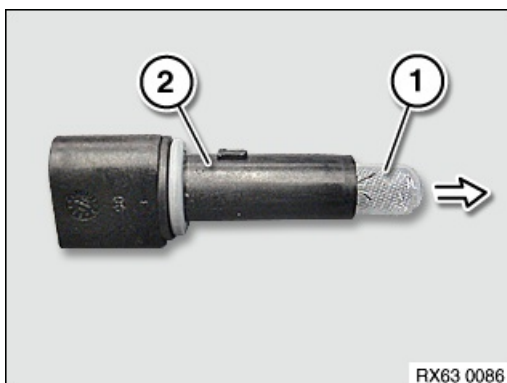
Turn cover (1) counter-clockwise

right side:

Turn cover (1) clockwise



Turn bulb holder (1) counter-clockwise and pull out from position light.
Disconnect plug connection (2).



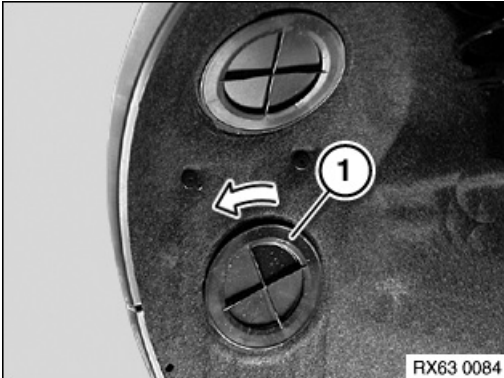
Pull out bulb for position light (1) from bulb holder (2).

Installation note:
Note bulb type.



**Warning!**

Follow instructions for handling light bulbs (exterior lights).

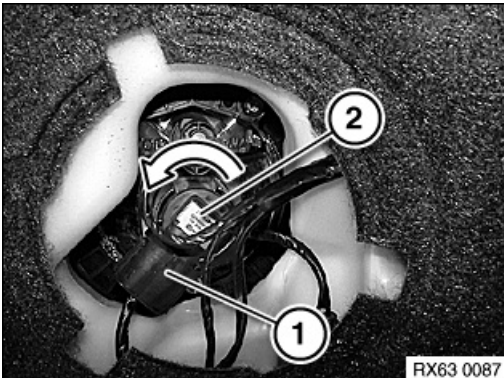


Turn cover (1) in direction of arrow and remove. *Note:*
left side:

Turn cover (1) counter-clockwise

right side:

Turn cover (1) clockwise



Disconnect plug connection (1).

Turn bulb (2) counter-clockwise and remove from fog light.

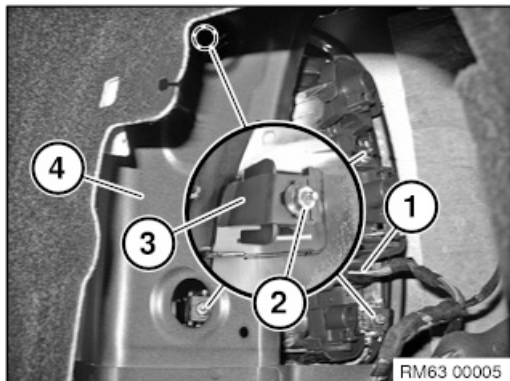
Installation note:

Note bulb type.



**Necessary preliminary work:**

- Partially remove luggage compartment wheel arch panel

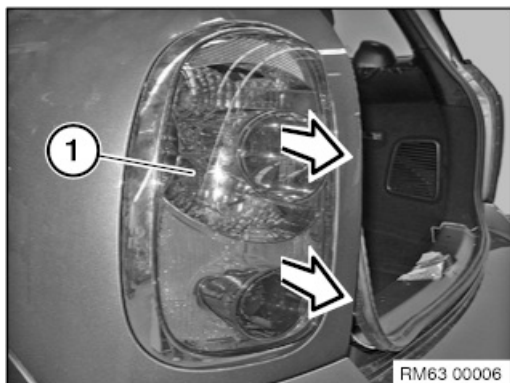


Unfasten plug connection (1) and disconnect.

Slacken nuts (2) until clamping claw (3) can be routed past side wall (4).

Installation note:

Make sure clamping claw (3) is correctly seated on side wall (4).



Carefully remove rear light (1) in direction of arrow.

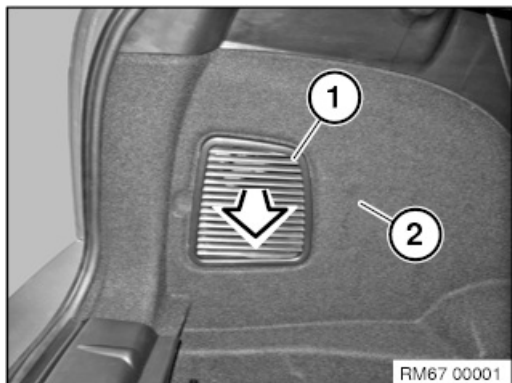
**Replacement:**

- If necessary, remove bulbs.

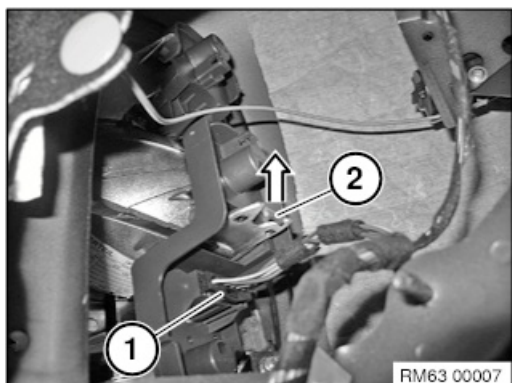


**Warning!**

Follow instructions for handling light bulbs (exterior lights).

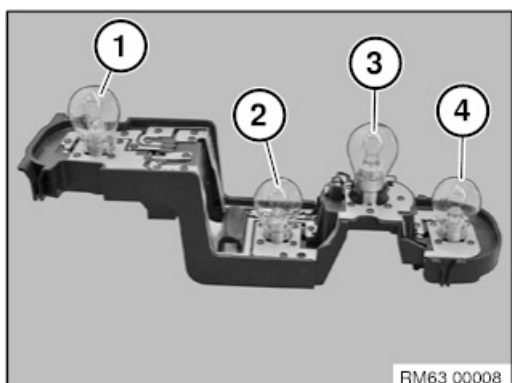


Remove cover (1) in direction of arrow from luggage compartment trim panel (2).



Unfasten plug connection (1) and disconnect.

Unlock socket housing (2) in direction of arrow and remove.



Turn bulb (1--4) in counterclockwise direction and pull out of socket housing.

1. Rear fog light (left rear light)/reversing light (right rear light)
2. Side lights
3. Turn indicator
4. Brake light

Installation note:
Note bulb type.



63 99 315

Replacing light bulb(s) for left or right rear light



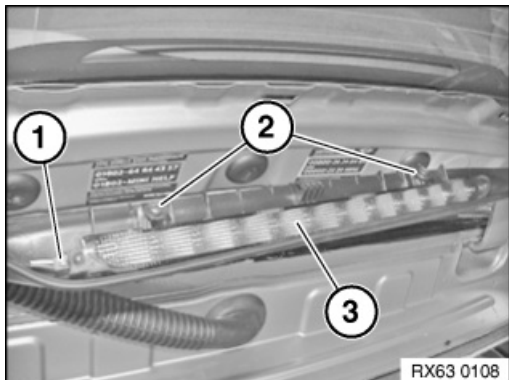
Operation is described in:

Remove one socket housing for rear light at left or right.



**Necessary preliminary tasks:**

- Remove trim panel for rear window frame at top

**On R60:**

If necessary, disconnect plug connection (1).

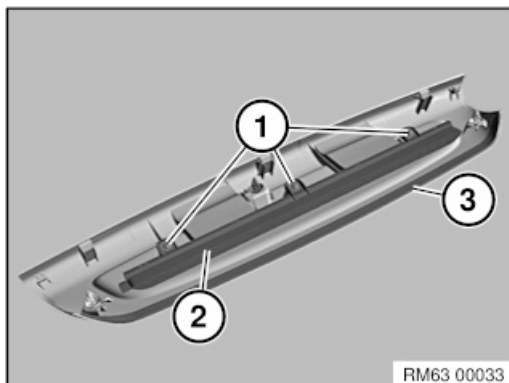
Unfasten screws (2).

Tightening torque 63 25 1AZ.

Remove the additional brake light (3) from the trim panel for the rear window frame at top.

Installation note:

Make sure the additional brake light (3) on the trim panel for the rear window frame is correctly fitted at top

**On R61:**

Release screws (1).

Tightening torque 63 25 1AZ.

Remove the additional brake light (2) from the trim panel (3).

Installation note:

Make sure the additional brake light (2) is correctly fitted on the trim panel (3)



63 26 000 plate light

Removing and installing/replacing left or right number/license



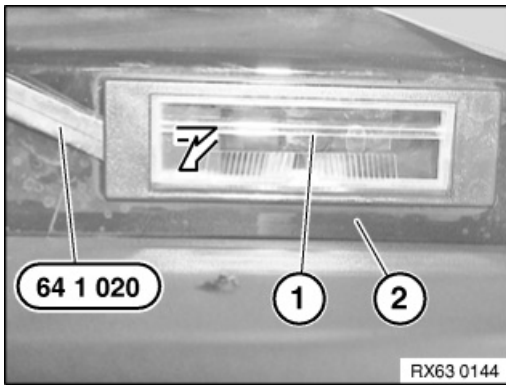
Special tools required:

- 64 1 020

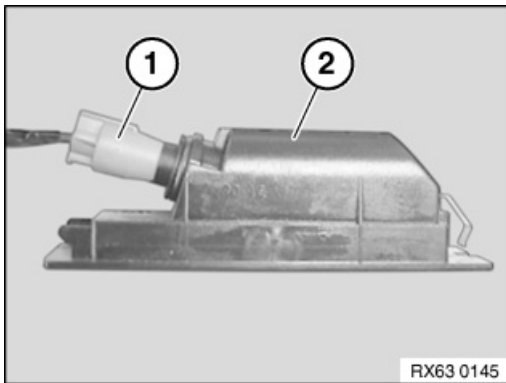


Important!

Follow instructions for handling light bulbs (exterior lights).



Lever the number plate light (1) out of the bumper trim (2) with special tool 64 1 020 in the direction of the arrow.



Disconnect plug connection (1).

Remove number plate light (2).

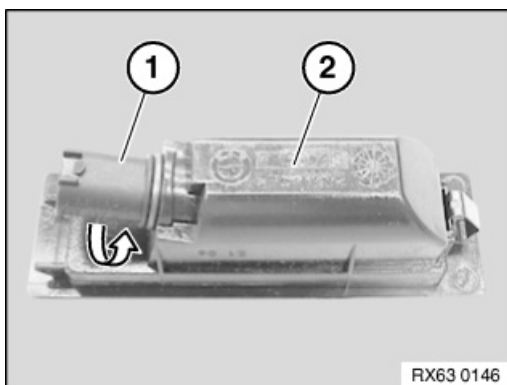


**Warning!**

Follow instructions for handling light bulbs (exterior lights).

**Necessary preliminary tasks:**

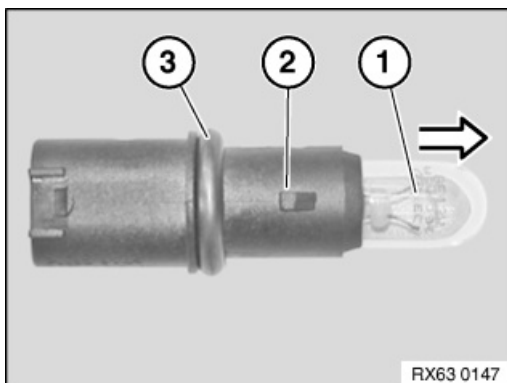
- Remove number plate light



Turn bulb holder (1) in direction of arrow and pull out of number/number plate light (2).

Installation note:

Make sure bulb holder (1) is correctly latched on number/number plate light (2).



Remove bulb (1) from bulb holder (2) in direction of arrow.

Installation note:

- Note bulb type.
- Make sure sealing ring (3) is correctly seated on bulb holder (2)



63 31 020 Remove and install / replace footwell light \ PREMIUM



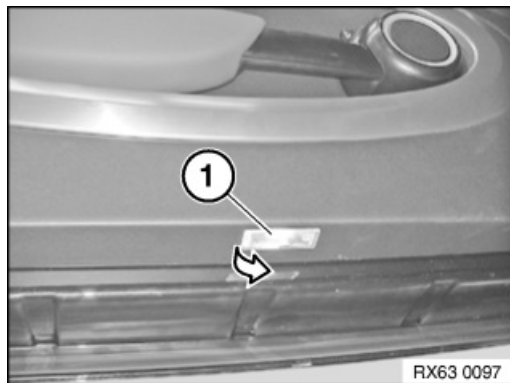
CAUTION

Danger through light source.

Danger of injury! Risk of short circuits!

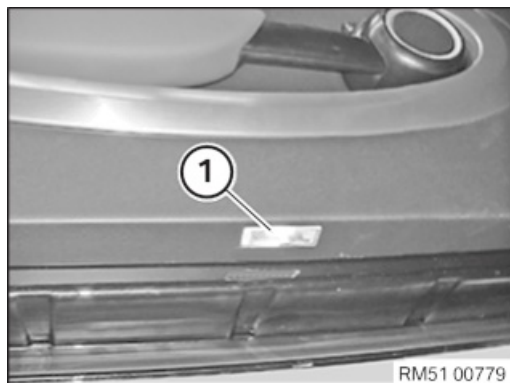
- Disconnect light source from voltage supply before replacing: Switch off lighting system and ignition.
- For additional information see: 63 99 Information on handling bulbs / light sources (exterior lights)

1 – Remove footwell light



- Lever footwell light (1) in direction of arrow out of door trim panel.
- Disconnect the associated plug connection and remove the footwell light (1).

2 – Install footwell light



- Connect the associated plug connection to the footwell light.
- Engage the footwell light (1) into the door trim panel.

Additional Information

Links

Repair instructions

Used in step

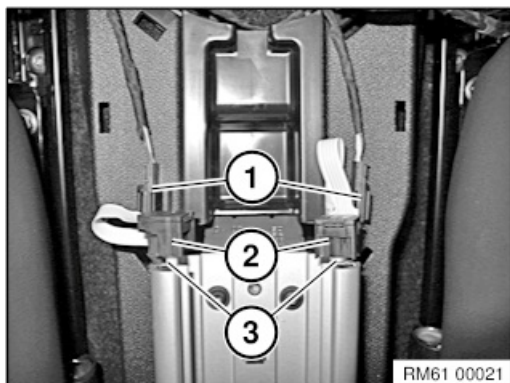
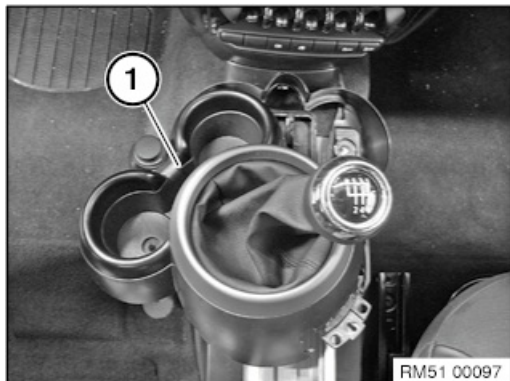
63 99 ... Safety information for handling bulbs / light sources (exterior lights)



**Necessary preliminary tasks:**

- Loosen the cup holder, front

Turn the cup holder (1) away toward the side.



Unfasten plug connection (1) and disconnect.

Carefully pull off the LED for the center rail (2) from the fibre optic conductor (3).

Installation note:

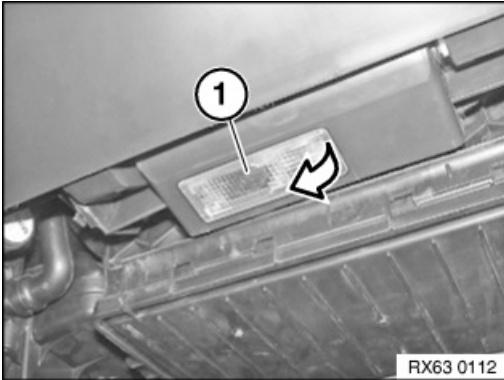
The LED for the center rail (2) must be felt to snap into place in the fibre-optic conductor (3).

The fibre-optic conductor (3) must not be damaged.



**Important!**

Follow notes for handling light bulbs (interior lights).



Lever out footwell light (1) in direction of arrow.

Disconnect associated plug connection and remove footwell light (1).

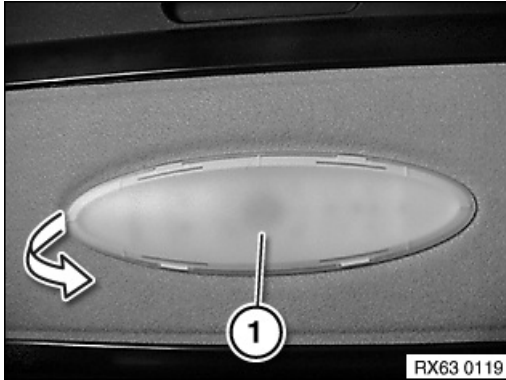
Replacement:

- If necessary, remove bulb.
- Note bulb type.



**Important!**

Follow instructions for handling light bulbs (interior lights).



Lever the interior roof light (1) out in the direction of the arrow.

Installation note:

Make sure the interior roof light (1) is correctly latched on the body.

Disconnect associated plug connection and remove interior roof light (1).

Replacement:

- If necessary, convert bulbs.



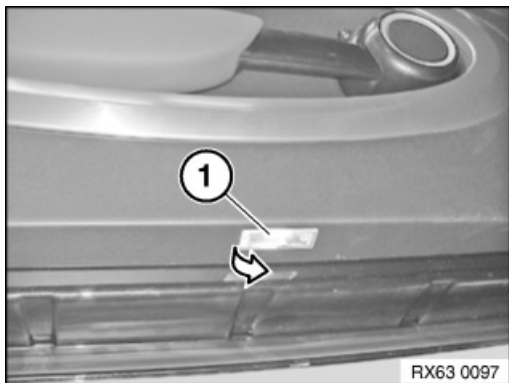
63 31 020
door)

Removing and installing/replacing footwell light (front bottom of



Important!

Follow instructions for handling light bulbs (interior lights).



Lever footwell light (1) in direction of arrow out of door trim panel.

Disconnect associated plug connection and remove footwell light (1).

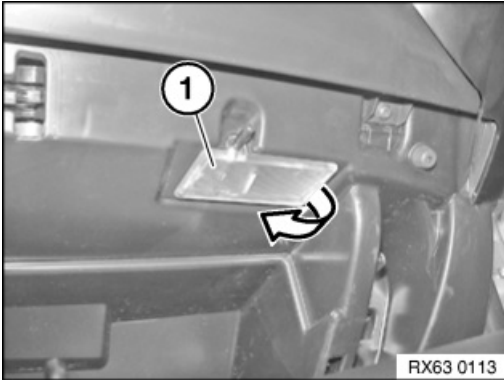
Replacement:

- If necessary, convert bulb



**Important!**

Note instructions for bulb replacement (interior lighting) .



Open glovebox.

Pry out glove box light (1) in direction of arrow.

Disconnect plug connection and remove glove box light (1).

Replacement:

- If necessary, convert bulb
- Note bulb type.

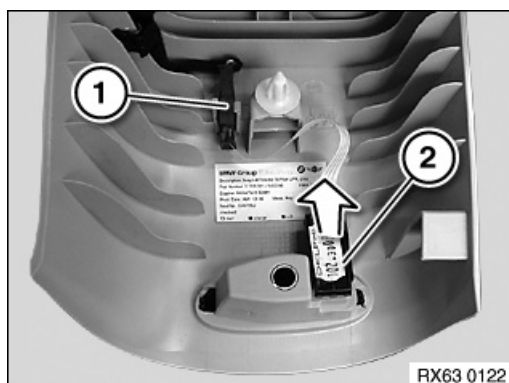


63 31 187 Removing and installing/replacing LED for door post trim panel on left or right (B-pillar)



Necessary preliminary tasks:

- Remove door post trim panel at top



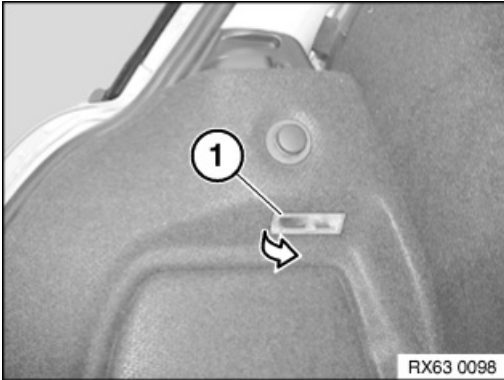
Disconnect plug connection (1).

Pull out LED for trim panel door post (2) in direction of arrow.



**Important!**

Follow instructions for handling light bulbs (interior lighting).

*Note:*

The graphic shows the R56

Lever out luggage compartment light (1) in direction of arrow.

Disconnect associated plug connection and remove luggage compartment light (1).

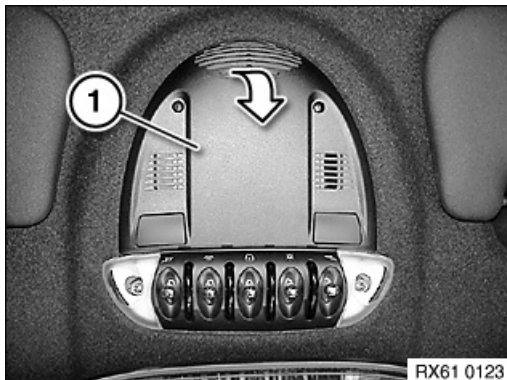
Replacement:

- If necessary, remove bulb.
- Note bulb type



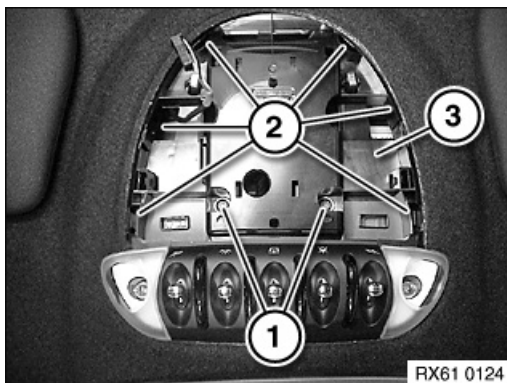
**Important!**

Read and comply with notes on protection against electrostatic damage (ESD protection).



Lever out the cover (1) from the roof operating facility.

If necessary, disconnect the microphone plug connection and remove the cover (1).



Release screws (1).

Unlock latch mechanisms (2).

Lower the roof operating facility (3).

Disconnect the associated plug connections and remove the roof operating facility (3).

Replacement:

- If necessary, convert bulbs.



63 99 437

Replace bulb for footwell light (at front bottom of door)



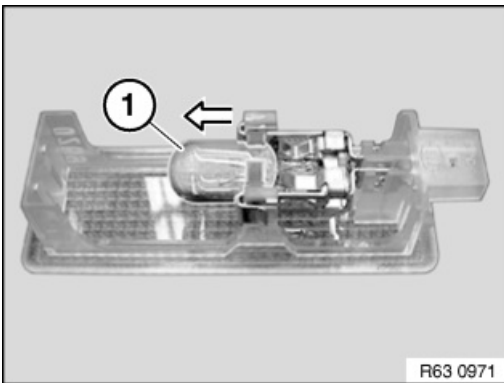
Warning!

Follow instructions for handling light bulbs (interior lights).



Necessary preliminary tasks:

- Remove footwell light



Pull bulb (1) in direction of arrow out of bulb holder.

Installation note:
Note bulb type.

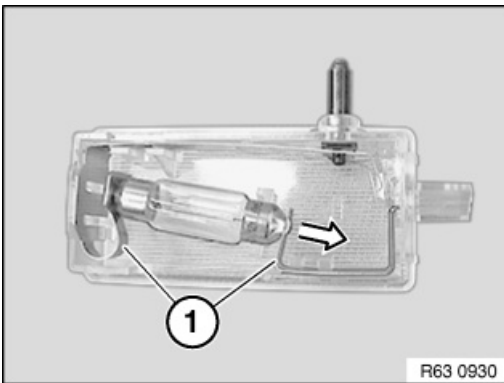


**Warning!**

Follow notes for handling light bulbs (interior lights).

**Necessary preliminary tasks:**

- Remove glovebox light

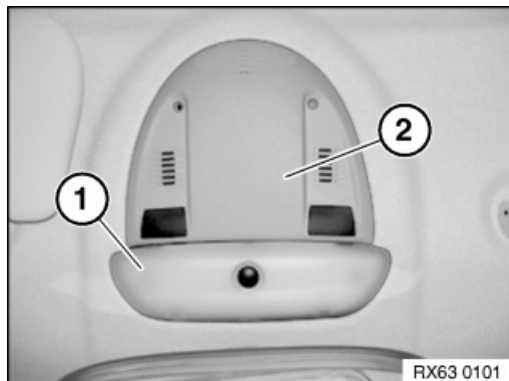


Spread bow contacts (1) and remove bulb. *Installation note:*
Note bulb type.

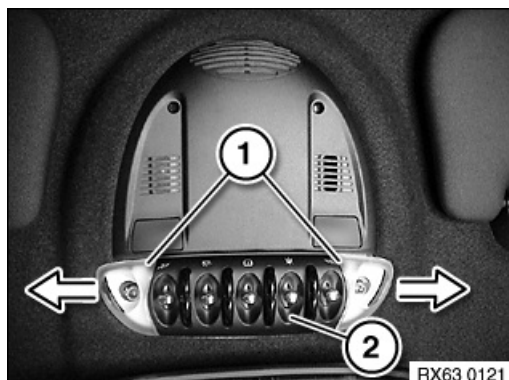


**Warning!**

Follow instructions for handling light bulbs (interior lights).

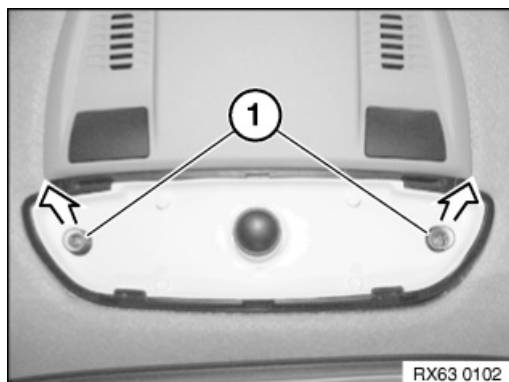


Lever out the cover (1) from the roof operating facility (2).



Optional equipment: light package:

Lever out the cover (1) from the roof operating facility (2).



Note:

Reflector must not be damaged.

Pull out bulb (1) in direction of arrow.

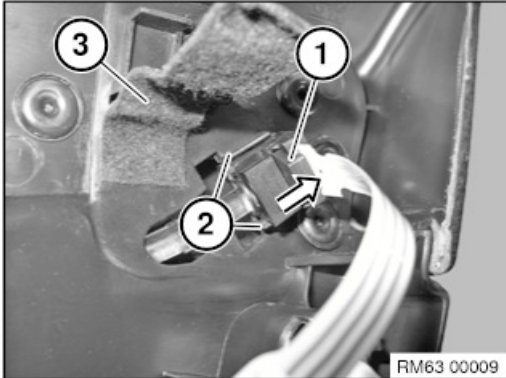
Installation note:

Note bulb type.



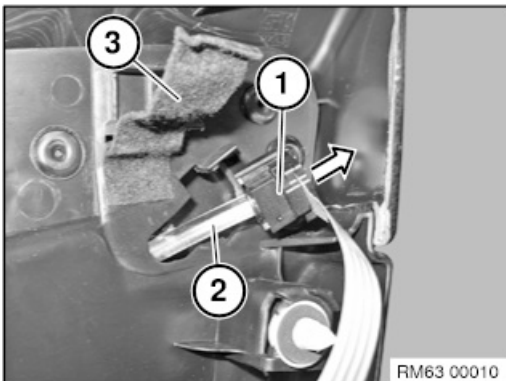
**Necessary preliminary tasks:**

- Remove front door trim panel



Carefully pull off felt strip (3).

Release the LED for the door trim panel lighting (1) from the bracket (2) and carefully lift in direction of arrow.



Carefully disconnect LED for door trim panel lighting (1) from fibre optic conductor (2). *Installation note:*

The LED for the door trim panel lighting (1) must be felt to snap into place in the fibre optic conductor (2).

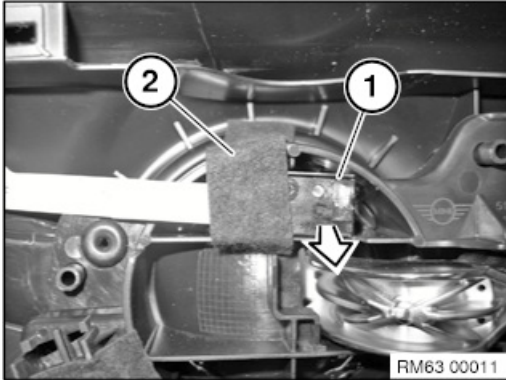
Fibre-optic conductor (2) must not be damaged.

Replace felt strip (3).



**Necessary preliminary tasks:**

- Remove front door trim panel



Carefully pull off felt strip (2).

Carefully detach LED for door opener (1) by pulling upward in direction of arrow.

Installation note:

LED for door opener (1) must be felt to snap in.

Replace felt strip (2).



**Necessary preliminary work:**

- Remove front rear door trim panel

Operation is described in:

Replacing LED for front door trim panel lighting.



**Necessary preliminary work:**

- Remove front rear door trim panel

Operation is described in:

Replacing LED for front inner door opener.

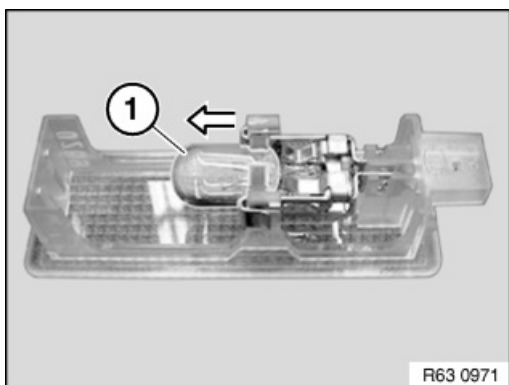


**Warning!**

Follow instructions for handling light bulbs (interior lights).

**Necessary preliminary tasks:**

- Remove footwell light



Pull bulb (1) in direction of arrow out of bulb holder.

Installation note:
Note bulb type.

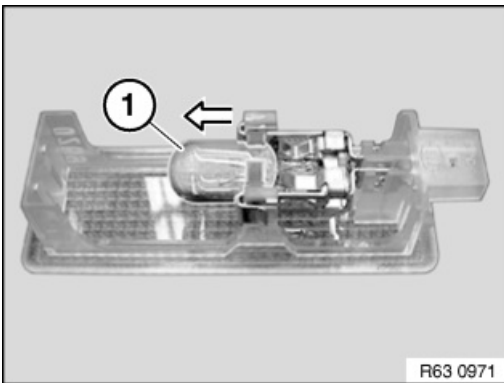


**Warning!**

Follow instructions for handling light bulbs (interior lights).

**Necessary preliminary tasks:**

- Remove luggage compartment light



Pull bulb (1) in direction of arrow from bulb holder.

Installation note:
Note bulb type.

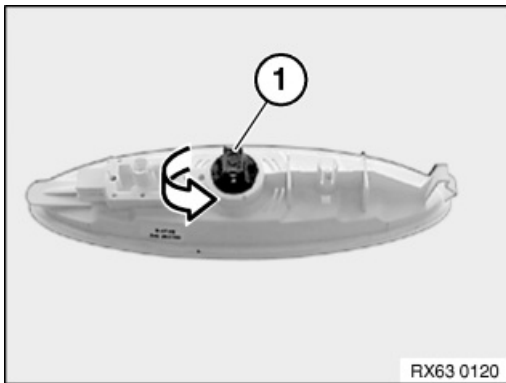


**Warning!**

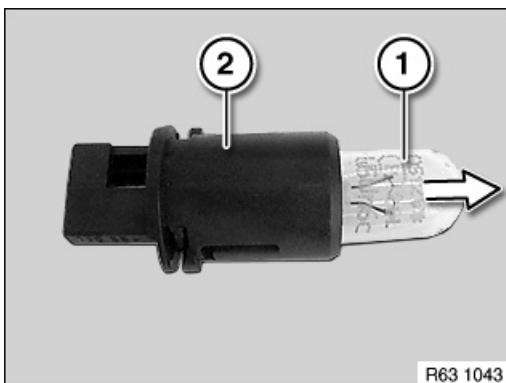
Follow instructions for handling light bulbs (interior lights).

**Necessary preliminary tasks:**

- Remove rear interior roof light



Turn bulb holder (1) in direction of arrow and pull out.



Remove bulb (1) from bulb holder (2) in direction of arrow.

Installation note:
Note bulb type.



**Warning!****Xenon headlight: Danger to life due to high voltage!**

Disconnect all components from voltage supply before removal.

Work on the entire xenon lighting system (ignition device, control unit and xenon bulb) may only be carried out by qualified personnel.

**Warning!****Halogen bulbs are under pressure:**

To avoid injury, wear protective goggles and gloves.

**Warning!****LEDs are potentially dangerous due to their dazzling effect:**

Do not look directly and unprotected into the light radiating from the LED.

**Important!**

To avoid short circuits:

Disconnect bulbs / light sources from the voltage supply before changing them (lighting system and ignition off).



Do not touch glass bulbs with bare hands, as even the smallest amount of contamination will burn in and reduce bulb service life.

Only touch light bulbs with clean gloves or a clean cloth.

Do not expose light bulbs to mechanical vibrations.

Use only recommended light bulbs.

Follow the light bulb manufacturer's notes without fail.



**Important!**

To avoid short circuits, disconnect bulbs from the power supply before replacing them (lighting system and ignition off).



Do not touch the glass bulbs in new lights bulbs as even the slightest contamination will burn in and reduce bulb service life.

Only touch light bulbs with clean gloves or a clean cloth.

Do not expose light bulbs to mechanical vibrations.

Use only recommended light bulbs.

Follow the light bulb manufacturer's notes without fail.



**Important!****Risk of damage!**

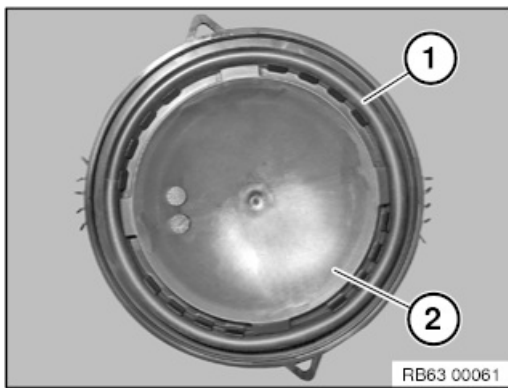
Damaged seals on the protective caps will lead to moisture penetration into the headlight.

This will in turn cause porous cable insulations and malfunctioning of the headlight.



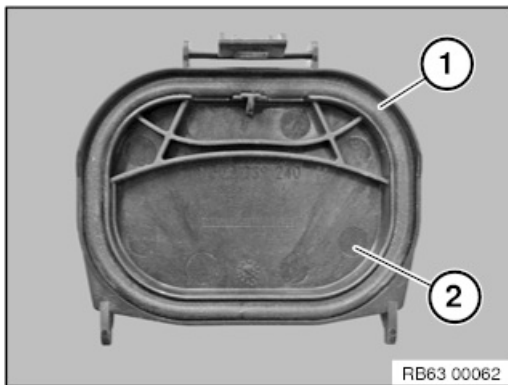
When working on the headlight system, check the protective cap seals.

Replace the protective cap in the event of damage!



Example: screwed protective cap

Seal (1) on protective cap (2).



Example: latchable protective cap

Seal (1) on protective cap (2).



63 99 437

Replace bulb for footwell light (at front bottom of door)



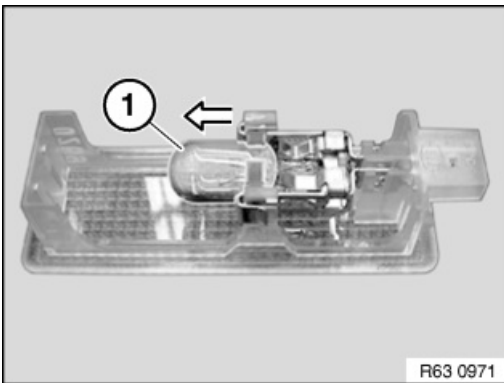
Warning!

Follow instructions for handling light bulbs (interior lights).



Necessary preliminary tasks:

- Remove footwell light



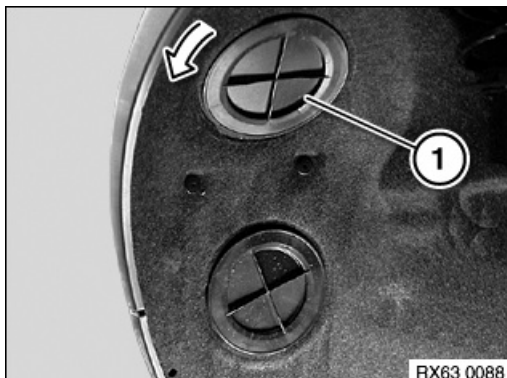
Pull bulb (1) in direction of arrow out of bulb holder.

Installation note:
Note bulb type.



**Warning!**

Follow instructions for handling light bulbs (exterior lights).

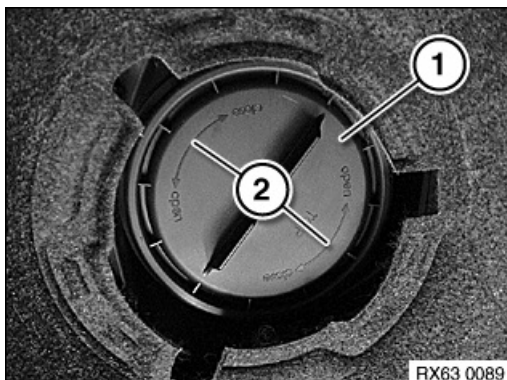


Turn cover (1) in direction of arrow and remove. *Note:*
left side:

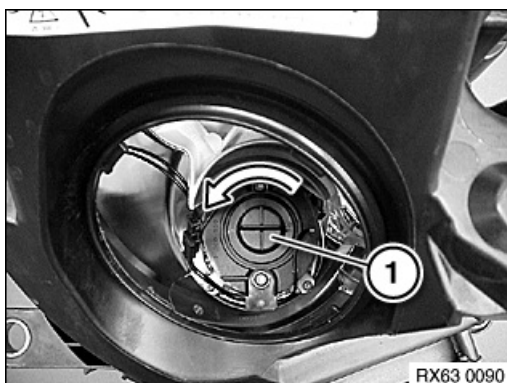
Turn cover (1) counter-clockwise

right side:

Turn cover (1) clockwise

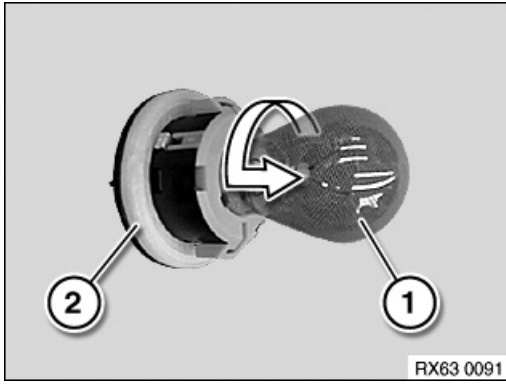


Turn the cover (1) in direction of arrow (2) and remove.



Turn bulb holder (1) counter-clockwise and pull out.



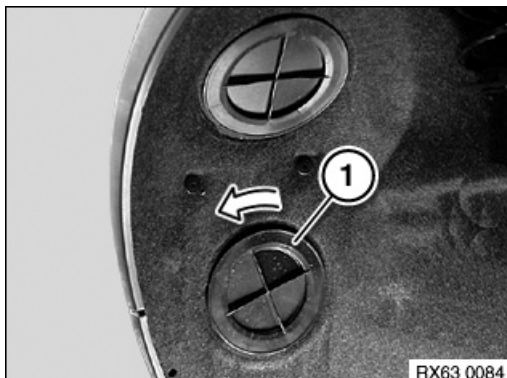


Turn bulb for front turn indicator (1) counter-clockwise and remove from bulb holder (2). *Installation note:*
Note bulb type.



**Warning!**

Follow instructions for handling light bulbs (exterior lights).

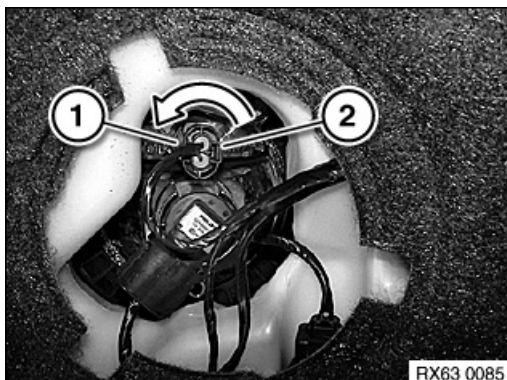


Twist cover (1) in direction of arrow and remove. *Note:*
left side:

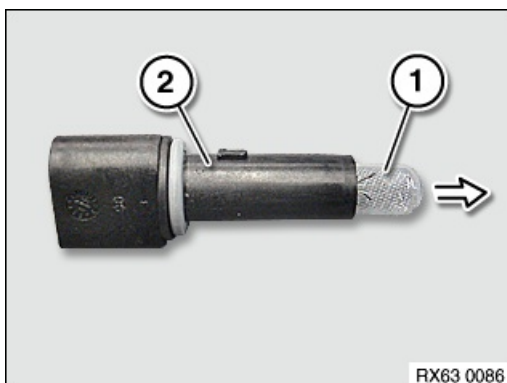
Turn cover (1) counter-clockwise

right side:

Turn cover (1) clockwise



Turn bulb holder (1) counter-clockwise and pull out from position light.
Disconnect plug connection (2).



Pull out bulb for position light (1) from bulb holder (2).

Installation note:
Note bulb type.

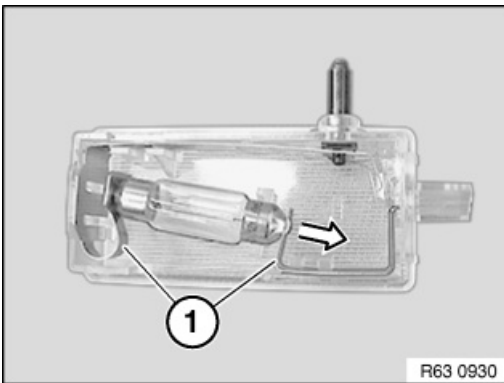


**Warning!**

Follow notes for handling light bulbs (interior lights).

**Necessary preliminary tasks:**

- Remove glovebox light



Spread bow contacts (1) and remove bulb. *Installation note:*
Note bulb type.



63 99 076
unit)

Replacing bulb for left (or right) xenon headlight (with ignition



Operation is described in:

Replacing ignition unit for left xenon headlight.

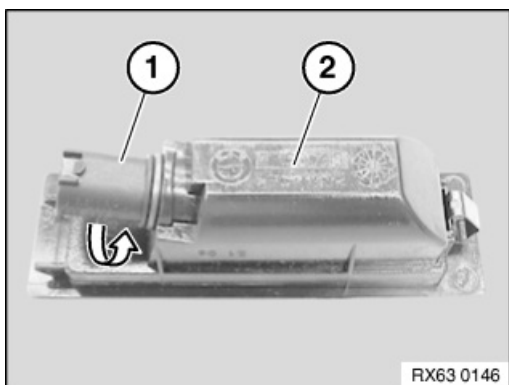


**Warning!**

Follow instructions for handling light bulbs (exterior lights).

**Necessary preliminary tasks:**

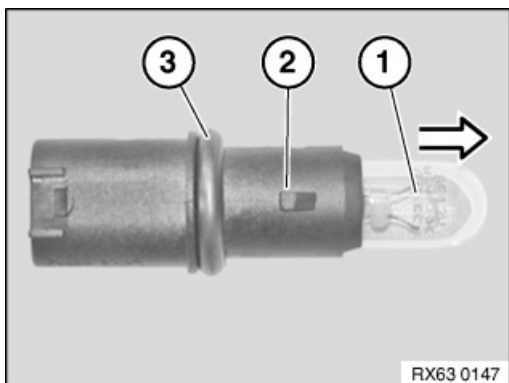
- Remove number plate light



Turn bulb holder (1) in direction of arrow and pull out of number/number plate light (2).

Installation note:

Make sure bulb holder (1) is correctly latched on number/number plate light (2).



Remove bulb (1) from bulb holder (2) in direction of arrow.

Installation note:

- Note bulb type.
- Make sure sealing ring (3) is correctly seated on bulb holder (2)

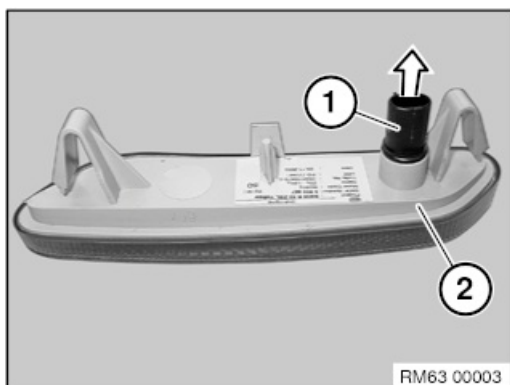


**Warning!**

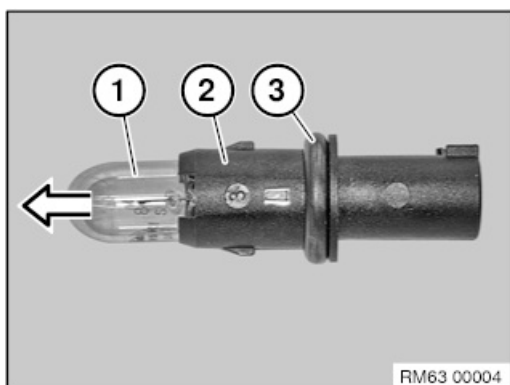
Follow instructions for handling light bulbs (exterior lights).

**Necessary preliminary tasks:**

- Remove side repeater on front left or right



Turn bulb holder (1) to the left and remove from front side repeater (2) in direction of arrow.



Pull bulb for side repeater (1) out of bulb holder (2).

Installation note:

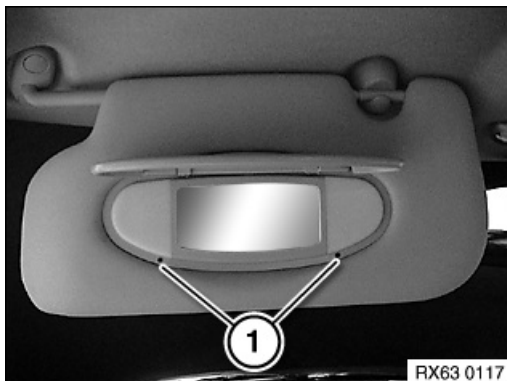
Make sure sealing ring (3) is correctly seated on bulb holder (2)

Note bulb type.

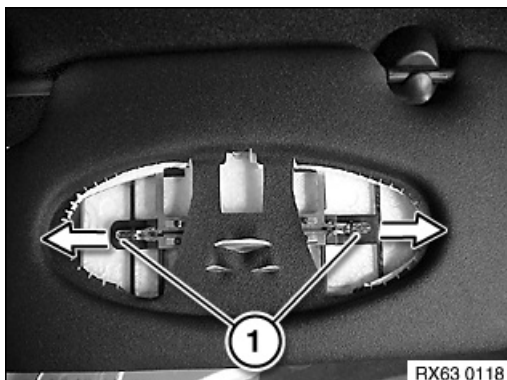


**Warning!**

Follow instructions for handling light bulbs (interior lights).



Unclip mirror at points (1) and remove.



Pull out bulbs (1) in direction of arrow.

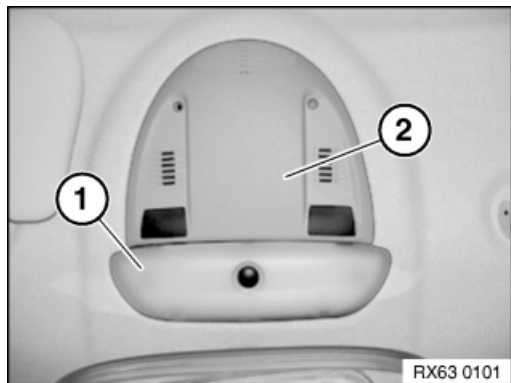
Installation note:

Note bulb type.

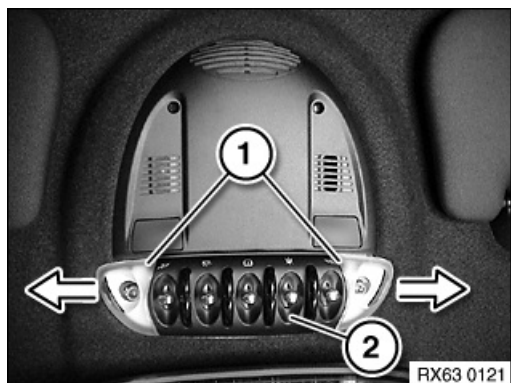


**Warning!**

Follow instructions for handling light bulbs (interior lights).

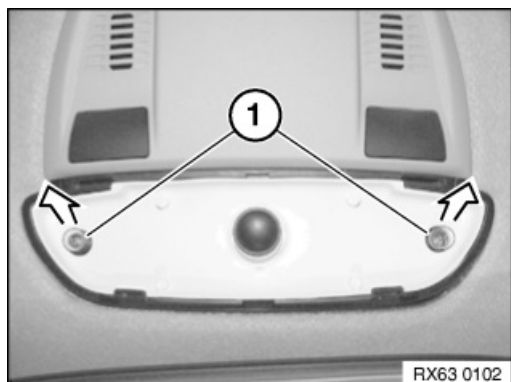


Lever out the cover (1) from the roof operating facility (2).



Optional equipment: light package:

Lever out the cover (1) from the roof operating facility (2).



Note:

Reflector must not be damaged.

Pull out bulb (1) in direction of arrow.

Installation note:

Note bulb type.

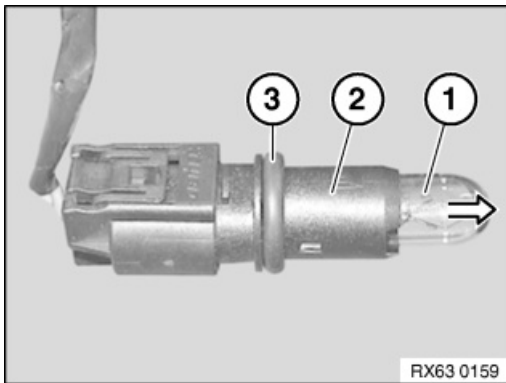


**Warning!**

Follow instructions for handling light bulbs (exterior lights).

**Necessary preliminary tasks:**

- Remove bulb holder of side marker light



Remove bulb (1) from bulb holder (2) in direction of arrow.

Installation note:

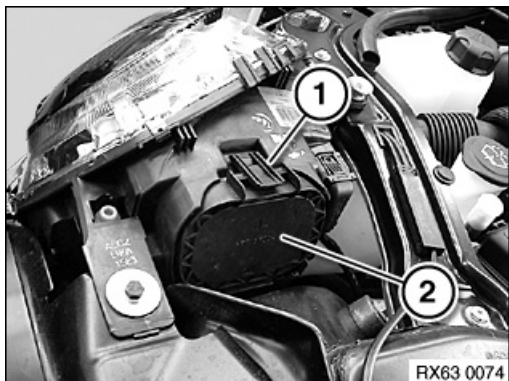
Make sure sealing ring (3) is correctly seated on bulb holder (2).

Note bulb type.



**Warning!**

Follow instructions for handling light bulbs (exterior lights).



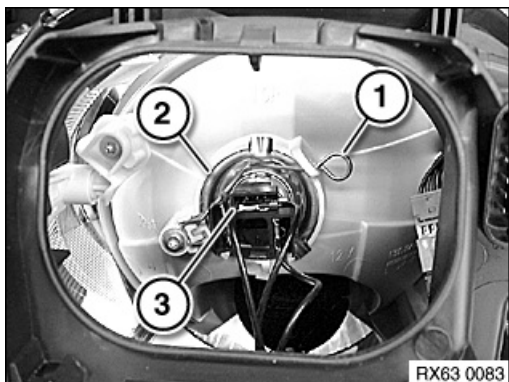
Unlock retaining tab (1) and remove protective cap (2) from headlight. *Installation note:*

Protective cap (2) must be correctly engaged.

Check seal.

Replace protective cap (2) if necessary.

Comply with Instructions for replacing the protective cap.



Release lock (1) and pull halogen bulb for high-beam headlight (2) out of headlight.

Disconnect plug connection (3) and remove halogen bulb for high-beam headlight (2).

Installation note:

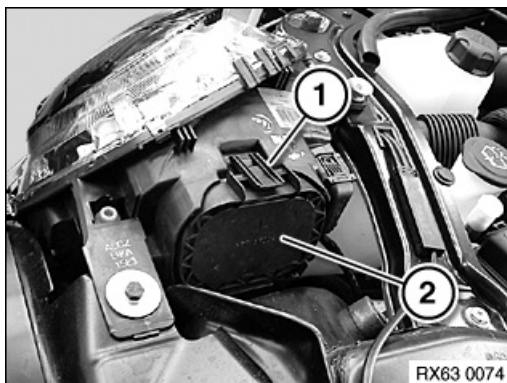
Make sure halogen bulb for high-beam headlight (2) is correctly seated.

Note bulb type.

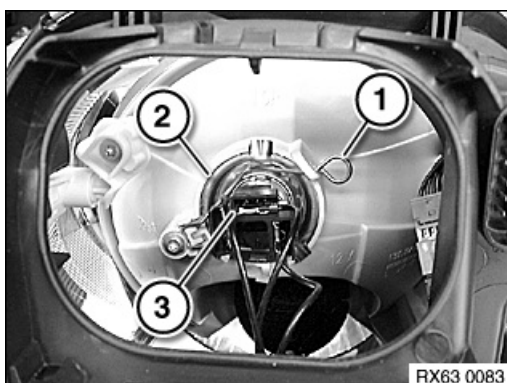


**Warning!**

Follow instructions for handling light bulbs (exterior lights).

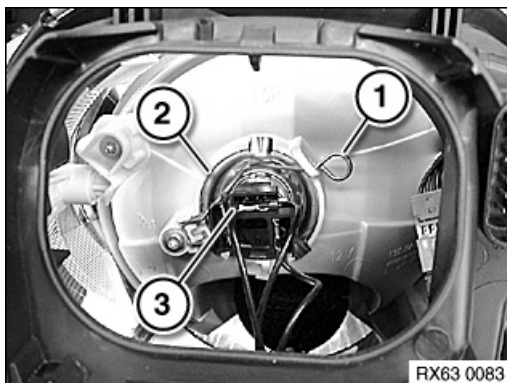
**REMOVAL:**

Turn protective cap (2) to the left and remove from headlight.



Release lock (1) and pull halogen bulb for headlight (2) out of headlight.
Disconnect plug connection (3) and remove halogen bulb for headlight (2).

**INSTALLATION:**

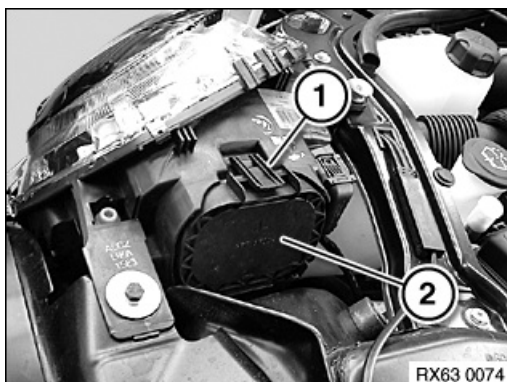


Insert halogen bulb for headlight (2) into headlight and close lock (1).
Connect connector (3).

Installation note:

Make sure halogen bulb for headlight (2) is correctly seated.

Note bulb type.



Insert protective cap (2) and turn to right to limit position. *Installation note:*

Check seal.

Comply with instructions for replacing the protective cap, replace protective cap (2) if required.

Protective cap (2) must be correctly engaged.



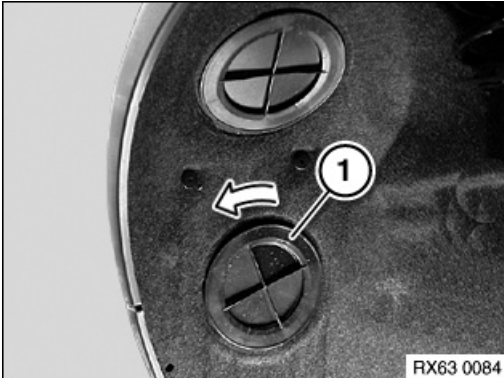
Recommendation:

Check headlight adjustment, correct if necessary.



**Warning!**

Follow instructions for handling light bulbs (exterior lights).

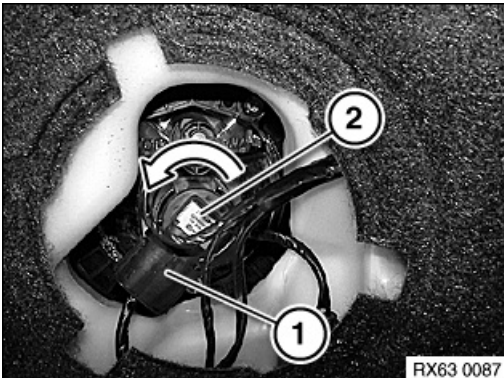


Turn cover (1) in direction of arrow and remove. *Note:*
left side:

Turn cover (1) counter-clockwise

right side:

Turn cover (1) clockwise



Disconnect plug connection (1).

Turn bulb (2) counter-clockwise and remove from fog light.

Installation note:

Note bulb type.

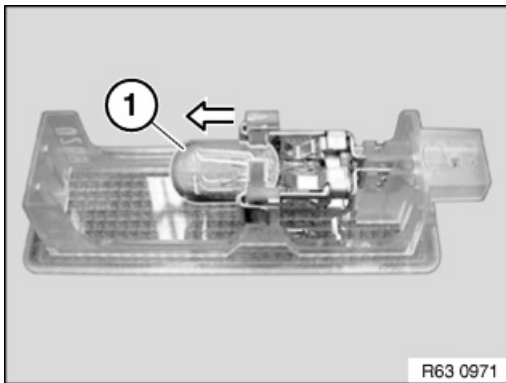


**Warning!**

Follow instructions for handling light bulbs (interior lights).

**Necessary preliminary tasks:**

- Remove footwell light



Pull bulb (1) in direction of arrow out of bulb holder.

Installation note:
Note bulb type.

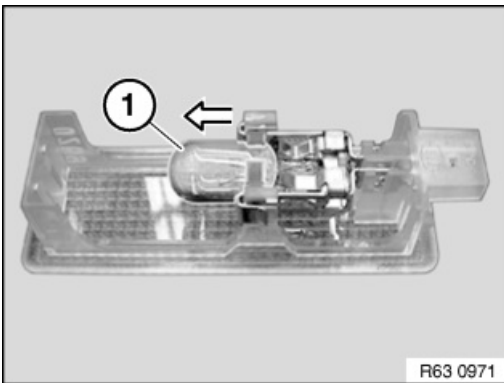


**Warning!**

Follow instructions for handling light bulbs (interior lights).

**Necessary preliminary tasks:**

- Remove luggage compartment light



Pull bulb (1) in direction of arrow from bulb holder.

Installation note:
Note bulb type.

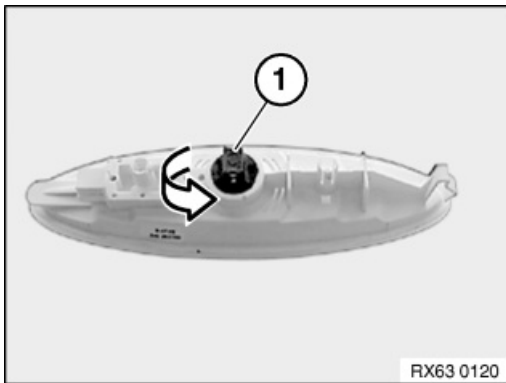


**Warning!**

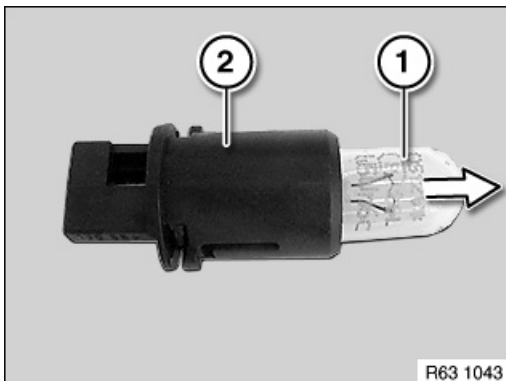
Follow instructions for handling light bulbs (interior lights).

**Necessary preliminary tasks:**

- Remove rear interior roof light



Turn bulb holder (1) in direction of arrow and pull out.



Remove bulb (1) from bulb holder (2) in direction of arrow.

Installation note:
Note bulb type.



63 99 315

Replacing light bulb(s) for left or right rear light



Operation is described in:

Remove one socket housing for rear light at left or right.





Warning!

All headlight types, regardless of the type of light sources used, can be dangerous due to their dazzling effect!

Do not look directly and for long periods of time into the light.



Warning!

Laser, LED and Xenon headlights in particular can be very dangerous due to their dazzling effect:

Do not look directly and unprotected into the light.



Warning!

Xenon headlight: Danger to life due to high voltage!

Disconnect all components from voltage supply before removal.

Work on the entire xenon lighting system (ignition device, control unit and xenon bulb) may only be carried out by qualified personnel.



Warning!

Halogen bulbs are under pressure:

To avoid injury, wear protective goggles and gloves.



Important!

To avoid short circuits:

Disconnect bulbs / light sources from the voltage supply before changing them (lighting system and ignition off).



Do not touch glass bulbs with bare hands, as even the smallest amount of contamination will burn in and reduce bulb service life.

Only touch light bulbs with clean gloves or a clean cloth.

Do not expose light bulbs to mechanical vibrations.

Use only recommended light bulbs.

Follow the light bulb manufacturer's notes without fail.



00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



Warning!

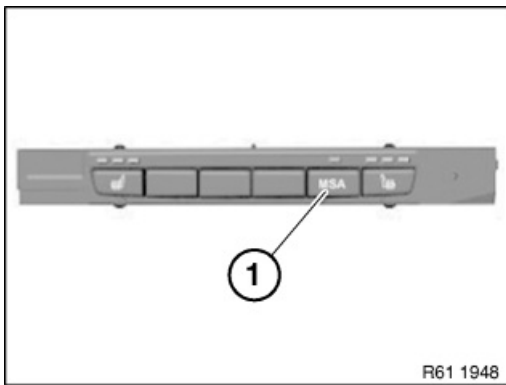
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

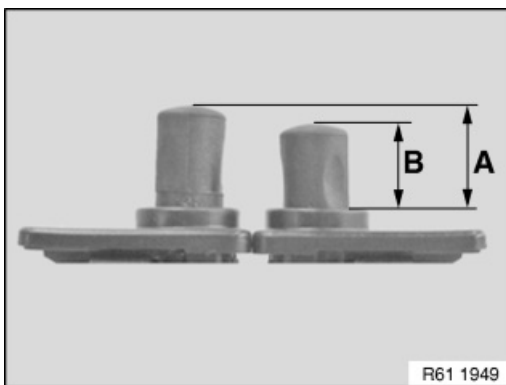
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode
A = 10 mm
 - Basic setting (engine hood/bonnet open)
B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



When working with diagnosis tools:

- Observe instructions in diagnosis tool





Note:

For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) Service Information (bulletin) 61 01 07 335
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) Service Information (bulletin) 61 01 10 629



64 00 ... Information on using cleaning agent/paints (personal protection equipment)



Warning!

Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!

Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!



Important!

Observe following instructions:

- Store cleaning agents/paints only in a secure cabinet.
- Keep cleaning agents/paints away from naked flames and other sources of ignition.
- Protect cleaning agents/paints from high temperatures and direct sunlight.
- Always keep an eye douche on hand, change the water regularly (once a month).



Important!

Observe following instructions before use:

- Manufacturer's instructions (on container/packaging)
- Hazard warnings (on container/packaging)
- Manufacturer's instructions on package insert
- Material safety data sheet of manufacturer
- Product information in EPC
- National market regulations



Important!

Observe following instructions during use:

- Do not eat, drink or smoke while working with these products.
- Avoid direct contact with skin and eyes.
- Wear personal protective clothing/equipment.
- Ensure that all enclosed areas are well ventilated or extract fumes directly.
- Immediately change working clothes soiled with cleaning agent/paint.
- After finishing work, wash your hands and apply protective skin cream.



Important!

Follow hazard warnings and wear personal protection equipment!





First Aid:

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapours ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.



Recycling:

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.



64 00 ... Overview of A/C service station

The following table shows an overview of the currently offered A/C service station depending on the refrigerant. *Note:*

The different refrigerant connections for C2H2F4 and R1234yf play no role during flushing, as the A/C service station is connected with the refrigerant circuit of the vehicle via the refrigerant line from the air conditioning compressor.

Description	Order number	Refrigerant		Flushing Refrigerant of circuit		Accessories for flushing
		R134a	R1234yf	Yes	No	Order number
Beissbarth 4100a	81 34 2 286 739	x		x		81 34 2 286 908
760R	81 34 2 289 569	x		x		81 34 2 289 571
WAECO AirCon Service Center	81 34 2 147 235	x		x		81 34 2 286 909
WAECO 2500 Low Emission	81 34 2 286 807	x		x		81 34 2 286 909
TEXA 770S	81 34 2 286 318		x		x	
BEISSBARTH 5100yf	81 34 2 286 325		x		x	
WAECO BMW 5000 Low Emission	81 34 2 286 324		x		x	



64 00 ... Overview of refrigerant oil to be filled

The following table shows an overview of which refrigerant oil may be added to which vehicle. *Note:*

The refrigerant oil to be filled can be found on the type plate on current vehicles.

Depending on the version and country, it may happen that the following table specifies a different refrigerant oil than the factory-filled refrigerant oil. This is permissible in certain cases. Observe notes on the refrigerant and refrigerant oil.

	Model series	R134a	R1234yf	ND-8	Sanden SP-A2
E	All vehicles with combustion engines	x		x	
	E72 Hybrid	x		x	
F (BMW and MINI)	All vehicles with combustion engines	x		x	
	All vehicles with combustion engines		x		x
	Hybrid	x		x	
	Hybrid		x	x	
	PHEV	x			x
	PHEV		x		x
G	All vehicles with combustion engines	x			x
	All vehicles with combustion engines		x		x
	PHEV	x			x
	PHEV		x		x
I	All	x			x
	All		x		x
R (MINI)	All vehicles with combustion engines	x		x	
	All vehicles with combustion engines		x		x
RR	RR1, RR2, RR3 before model facelift	x		x	
	RR4 with optional rear air conditioning	x		x	
	All other vehicles	x			x
	All other vehicles		x		x



00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



Warning!

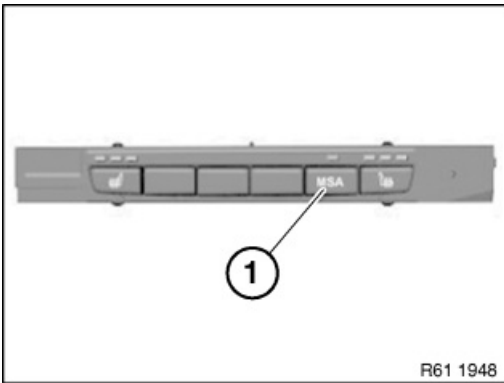
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

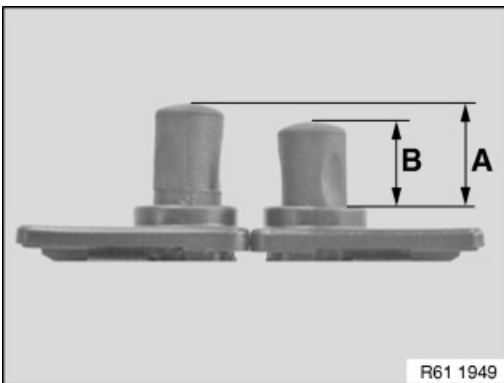
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode
 $A = 10 \text{ mm}$
 - Basic setting (engine hood/bonnet open)
 $B = 7 \text{ mm}$

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



When working with diagnosis tools:

- Observe instructions in diagnosis tool





Note:

For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) Service Information (bulletin) 61 01 07 335
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) Service Information (bulletin) 61 01 10 629



64 11 367 Removing and installing (replacing) control panel for heating and air conditioning system



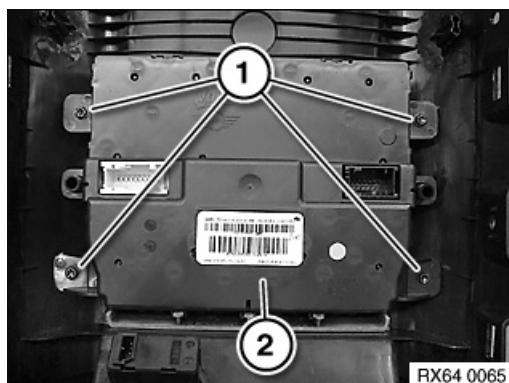
Important!

Read and comply with notes on protection against electrostatic discharge (ESD protection).



Necessary preliminary tasks:

- Remove centre console cover



Release screws (1).

Remove control panel for heater - air conditioning system (2).



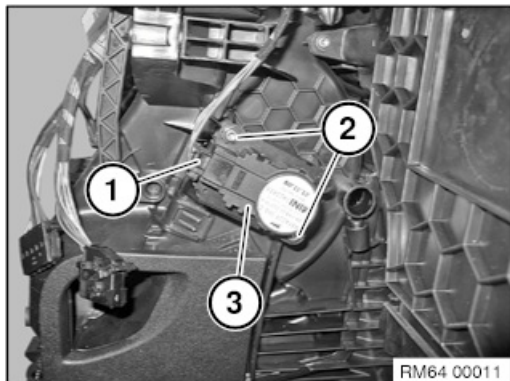
Replacement:

Carry out programming/encoding.



**Necessary preliminary tasks:**

- Remove dashboard complete with support



Disconnect plug connection (1).

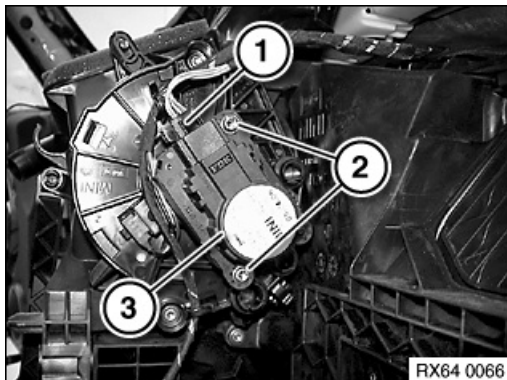
Release screws (2) and remove actuator drive (3).





Necessary preliminary tasks:

- Remove dashboard complete with support



Disconnect plug connection (1).

Release screws (2) and remove actuator drive (3).

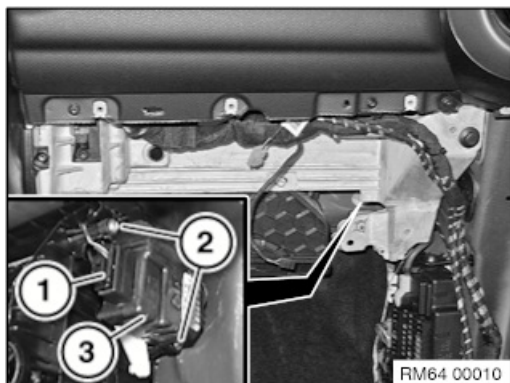


64 11 805 Removing and installing/replacing actuator drive for fresh / recirculated air flap



Necessary preliminary tasks:

- Remove right glove box with housing



Disconnect plug connection (1).

Release screws (2) and remove actuator drive (3).

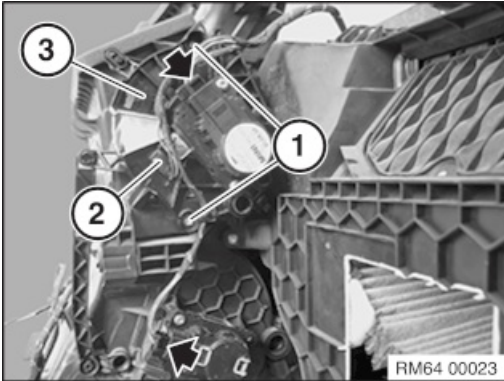
Installation note:

Make sure relay levers are correctly seated.



**Necessary preliminary tasks:**

- Remove heater



Unlock and disconnect plug connections at marked points.

Disengage microswitch (2).

Release screws (1).

Remove central kinematics (3).



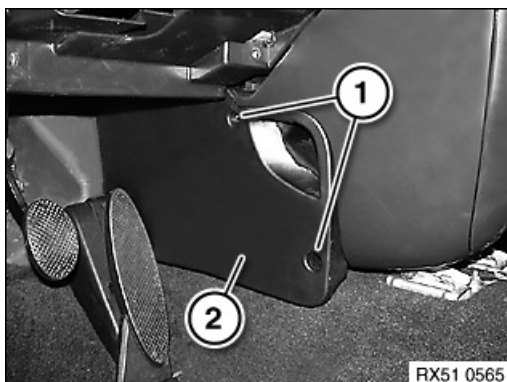
**Necessary preliminary tasks:**

- Remove instrument panel trim at bottom left
- Remove the EGS control unit (**vehicles with automatic transmission only**)

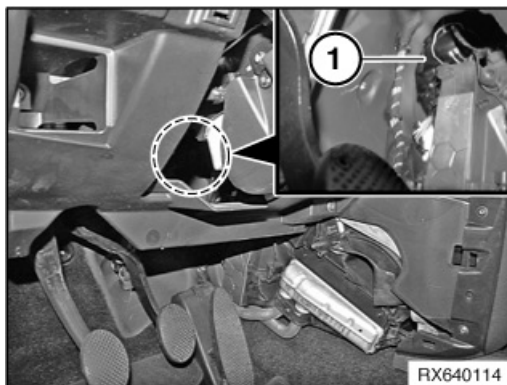
**Important for right hand drive vehicles!**

Blower is located above clutch pedal (brake pedal in automatic transmission vehicles) on bulkhead.

On these vehicles dashboard with support must also be removed.

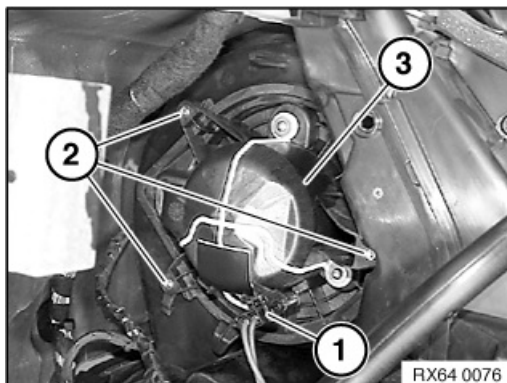


Release screws (1) and remove cover (2).

**Note:**

Left hand drive vehicles: Blower (1) is located above accelerator pedal on bulkhead.

Right hand drive vehicles: Blower is located above clutch pedal (brake pedal in automatic transmission vehicles) on bulkhead (no graphic).

**Note:**

For purposes of clarity, illustration shows dashboard removed.

Disconnect plug connection (1).

Release screws (2) and feed out blower (3).





Special tools required:

- 00 9 030



Warning!

Avoid contact with refrigerant and refrigerant oil.
Follow the safety information for handling refrigerants.
Follow safety instructions for handling refrigerant oil.



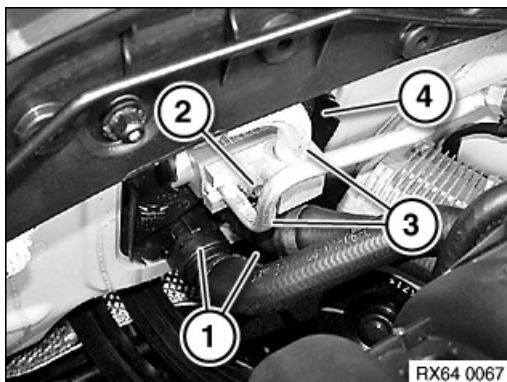
Warning!

Follow notes for repair work on cooling system.



Necessary preliminary work:

- Draw off refrigerant from air conditioning system
- Remove dashboard complete with support
- Remove intake silencer housing
- **N47 only:** Remove right charge-air duct



Unlock and detach coolant lines (1).

Carefully blow through twin pipes to remove remaining coolant from heat exchanger.

Slacken nut (2).

Tightening torque 64 11 4AZ.

Disconnect refrigerant lines (3).

Installation note:

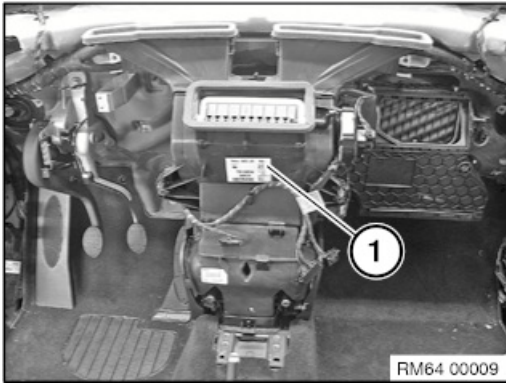
Renew sealing rings.

Use special tool 00 9 030 to install sealing rings without damaging them.

Ensure gasket (4) is correctly seated.

Vent cooling system and check for watertightness.

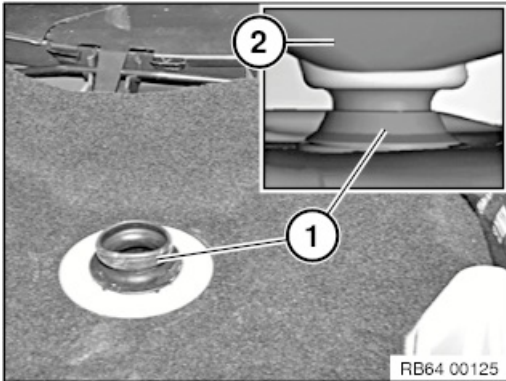




Remove heating and air-conditioning unit (1) with an auxiliary person helping. *Installation note:*

Heating and air-conditioning unit is held by support for dashboard.

When installing support with dashboard, make sure heating and air-conditioning unit is in correct position.



Attention!

Risk of water damage in the passenger compartment!

Installation note:

Spray condensate drain (1) with lubricant G14(sourcing reference BMW Group Parts) before installation of heating and air-conditioning unit (2).

Make sure heating and air-conditioning unit (2) is correctly seated on condensate drain (1).

Perform a visual inspection after installing the heating and air-conditioning unit (2).

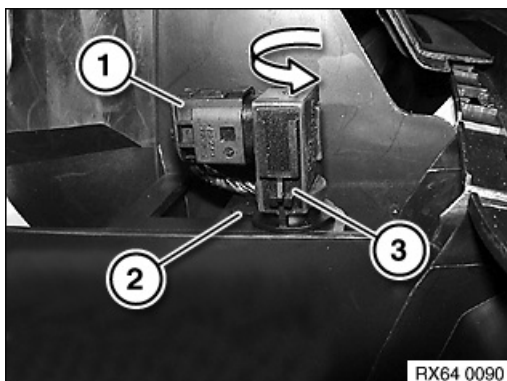


64 11 991 Removing and installing/replacing sensor for automatic air recirculation control



Necessary preliminary tasks:

- Remove right cowl panel cover



Disconnect plug connection (1).

Unclip catch (2) and unscrew sensor (3) from bracket in direction of arrow.

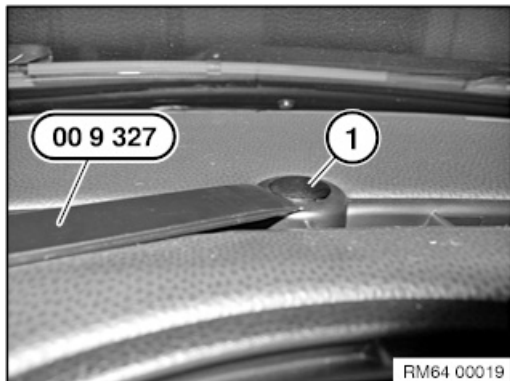
Installation note:

Make sure sensor (3) is correctly seated in fixture.

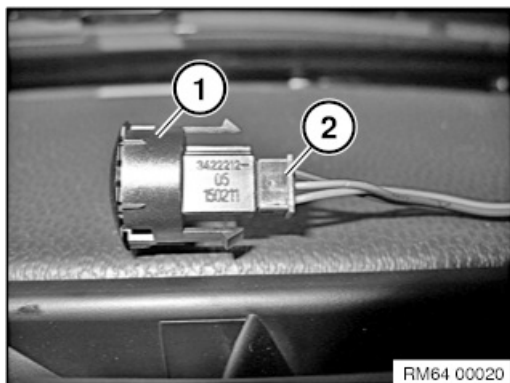


**Special tools required:**

- 00 9 327



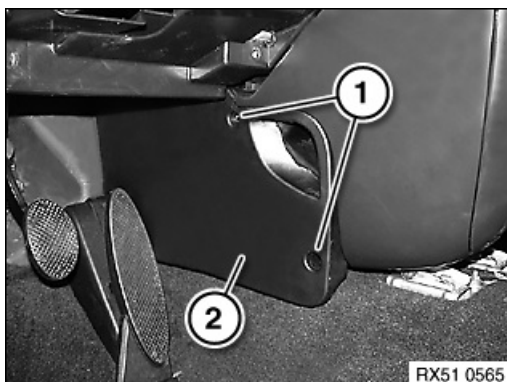
Unclip and pull out solar sensor (1) with special tool 00 9 327 .



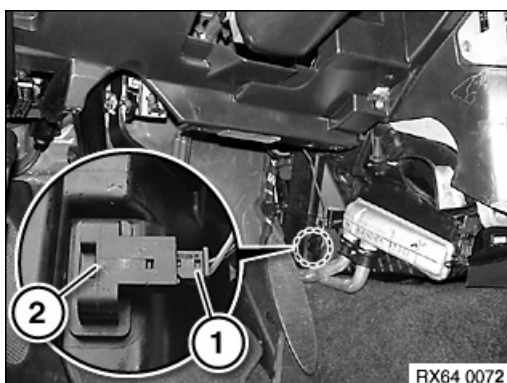
Unlock and disconnect plug connection (2) Remove solar sensor (1).



64 11 942 Replace the evaporator temperature sensor (IHKR/IHKA)



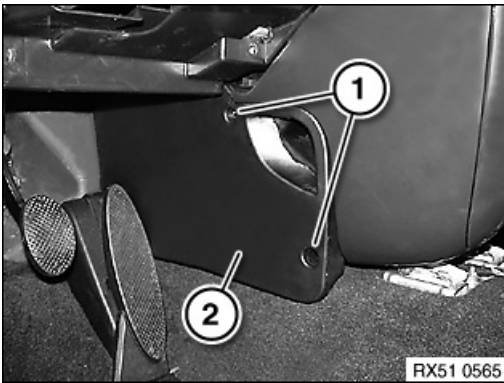
Release screws (1) and feed out cover (2) towards bottom.



Disconnect plug connection (1).

Pull out the evaporator temperature sensor (2).

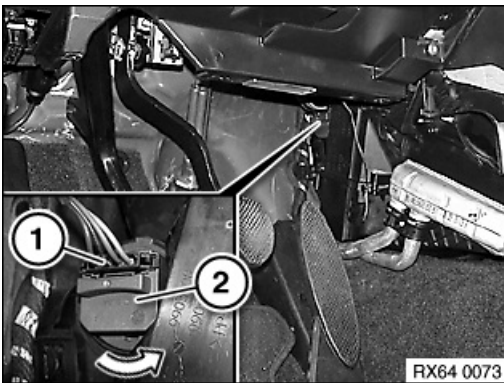




Release screws (1) and feed out cover (2) towards bottom.



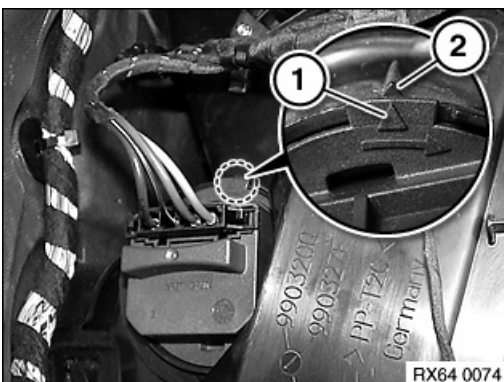
There are two controller versions for the heating and air conditioning system.



Version A.

Disconnect plug connection (1).

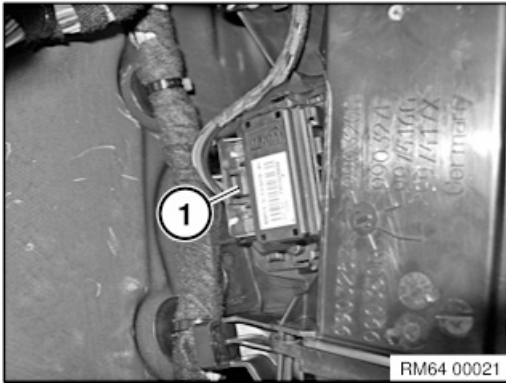
Turn controller (2) slightly to the left and remove.



Installation note:

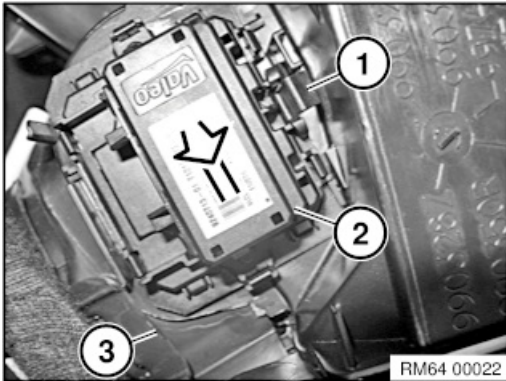
Mark (1) on controller must line up with mark (2) on heating and air-conditioning unit.





Version B.

Unfasten plug connection (1) and disconnect.



Release lock (1).

Slide controller (2) upwards slightly and pull out of heating and air-conditioning unit (3).



64 11 207 Replacing heat exchanger



Special tools required:

- 00 9 030



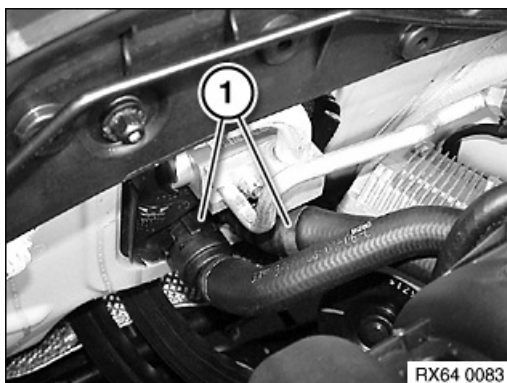
Warning!

Follow instructions for working on cooling system.



Necessary preliminary tasks:

- Remove intake silencer housing



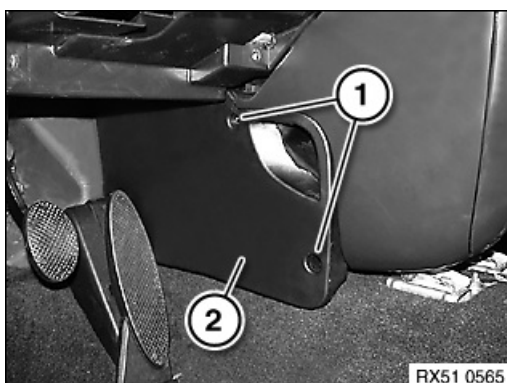
Unlock and detach coolant lines (1).

Carefully blow through twin pipes to remove remaining coolant from heater core.

Installation note:

Make sure coolant lines (1) are correctly seated.

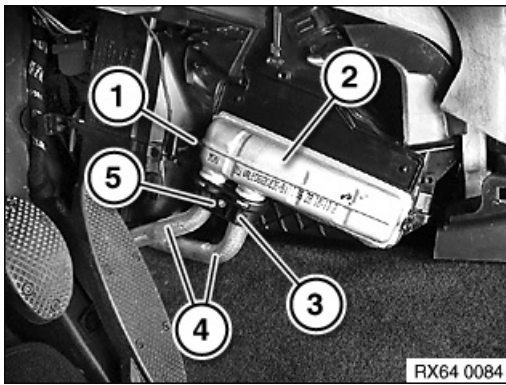
Vent cooling system and check for watertightness.



Remove instrument panel trim at bottom left.

Release screws (1) and feed out cover (2) towards bottom.





Note:

Have cloths or paper towels ready in order, if necessary, to catch escaping coolant.

Release screws (1) and pull out heater core (2) approx. 10 mm.

Release screw (5).

Unclamp holder (3) and remove.

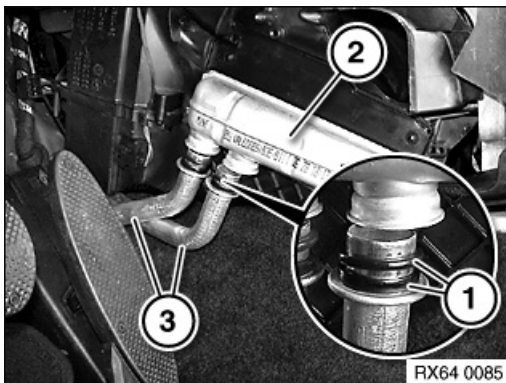
Carefully pull twin pipes (4) out of heater core (2) and if necessary catch escaping coolant.

Carefully pull out heater core (2).

Installation note:

Fins of heater core (2) must not be damaged.

Make sure heater core (2) is correctly seated.



Installation note:

Replace sealing rings (1).

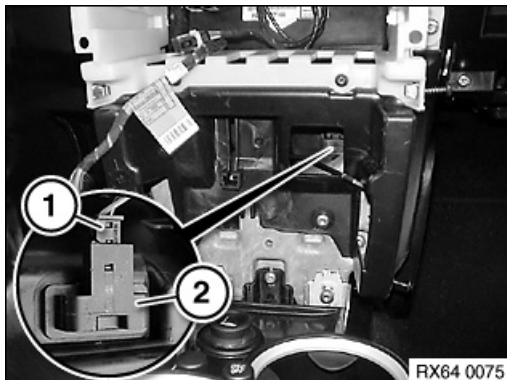
Use special tool 00 9 030 to fit sealing rings (1) without damaging them.

Make sure twin pipes (3) are correctly seated on heater core (2).



**Necessary preliminary tasks:**

- Remove centre console cover



Disconnect plug connection (1).

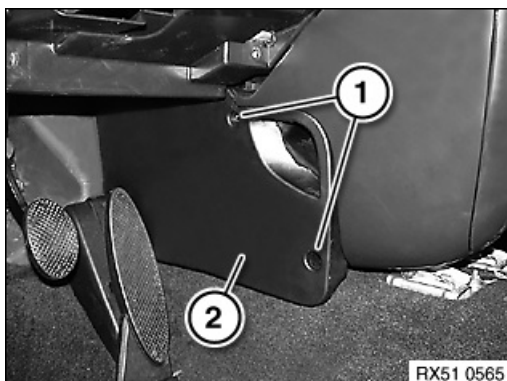
Withdraw temperature sensor (2).



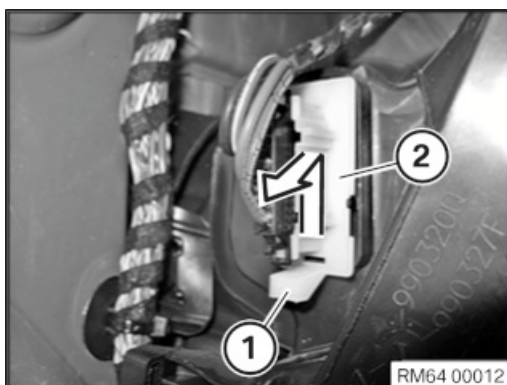
64 11 221 Replacing the resistor for the blower of the heating and air-conditioning unit (IHR/IHKR)



Removal:

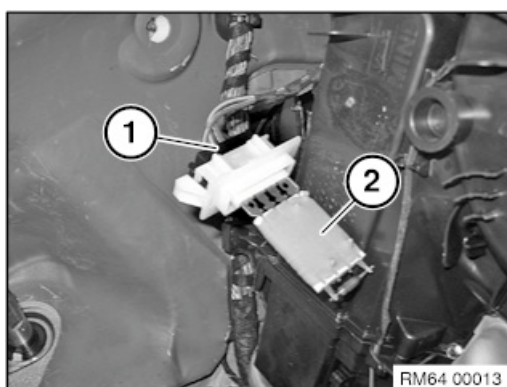


Release the screws (1) and feed out the cover (2) towards the bottom.



Unlock the retaining lug (1) (towards the top).

Pull the resistor (2) out of the guide in the direction of arrow.



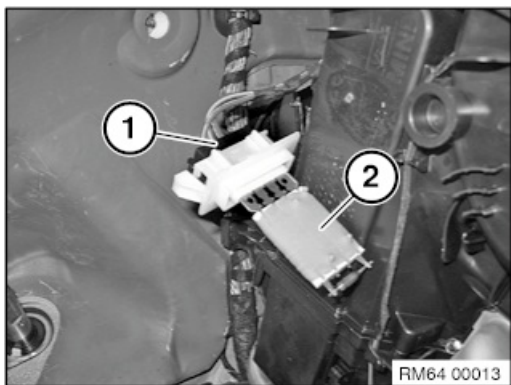
Unfasten plug connection (1) and disconnect.

Take off resistor (2).

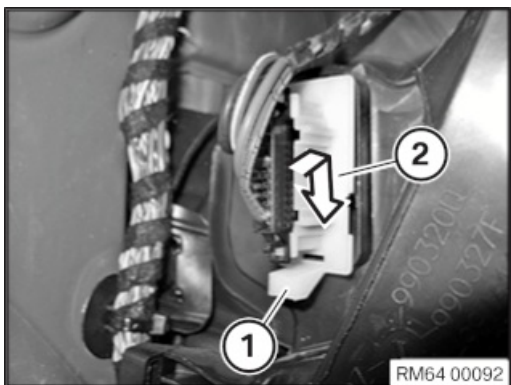


Installation:

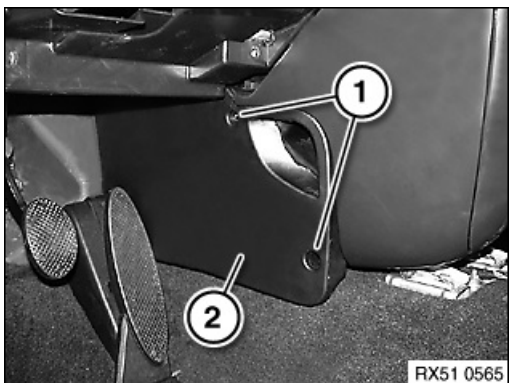




Connect and lock the plug connection (1) on the resistor (2).



Insert the resistor (2) in the direction of arrow and pay attention to properly locking the retaining hook (1). Perform a tension check!

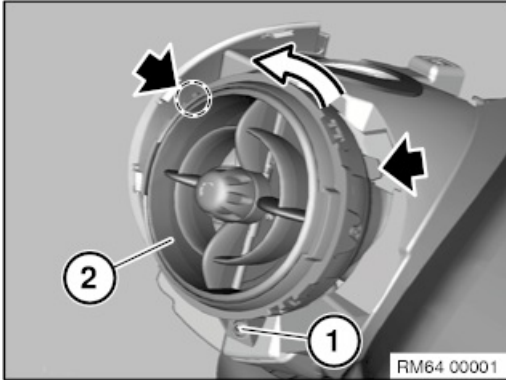


Feed in the cover (2) and tighten the screws (1).



**Necessary preliminary tasks:**

- Remove air outlet vent cover on left



Release screw (1).

Disengage fresh air grille (2) in direction of arrow and take off.

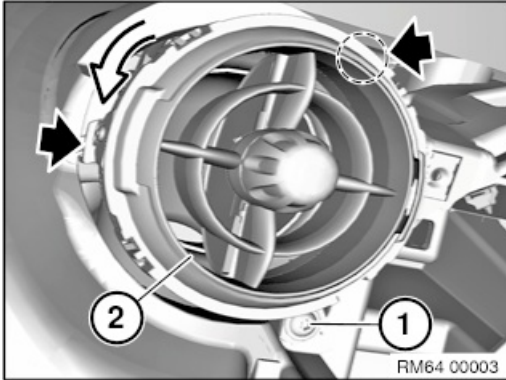
Installation note:

The retaining lugs must be correctly locked at the marked positions.



**Necessary preliminary tasks:**

- Remove instrument panel cover

*Note:*

Removal of the centre left fresh air grille is described.

Release screw (1).

Disengage fresh air grille (2) in direction of arrow and take off.

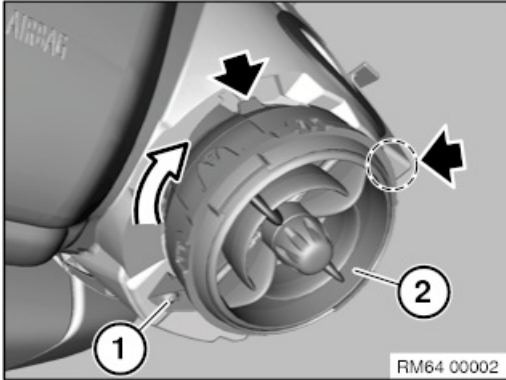
Installation note:

The retaining lugs must be correctly locked at the marked positions.



**Necessary preliminary tasks:**

- Remove cover of right-hand air outlet vent at side



Release screw (1).

Disengage fresh air grille (2) in direction of arrow and take off.

Installation note:

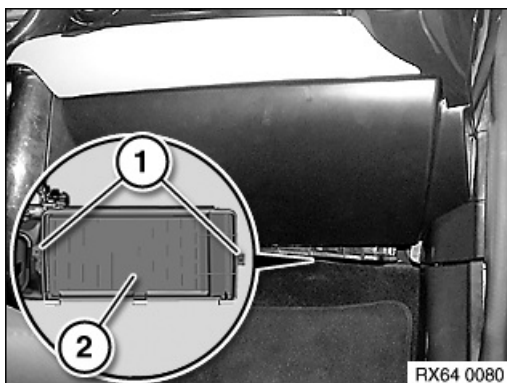
The retaining lugs must be correctly locked at the marked positions.



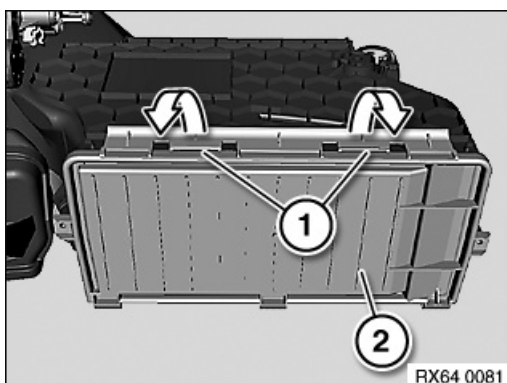
**Important!**

Risk of damage!

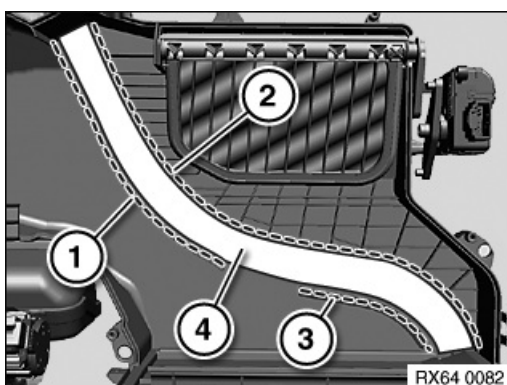
Air conditioning must not be operated without the prescribed filter element.



If necessary, release screws (1) on cover (2).



Release catches (1) and fold cover (2) downwards. *Installation note:* Ensure cover (2) is correctly seated.



Pull microfilter (4) out of guides towards bottom. *Installation note:* Feed in microfilter (4) between guides (1 and 2).

Slide microfilter (4) over guide (3).

Make sure microfilter (4) is correctly seated on all guides.



64 50 ... A/C performance test

Observe the following conditions prior to the A/C performance test:

1. Connect diagnosis system. Check of the fault memory (no faults in the fault memory).
2. Attach a thermometer with separate display element to the head restraint. Lay display element outwards out of passenger compartment.
3. Perform the test in a suitable workshop area with an ambient temperature above 18° C.
4. Vehicle temperature should be approximately the same as the ambient temperature in the workshop.
5. Engine must be at operating temperature (does not apply for electric vehicles).
6. ECO PRO mode must not be switched on.

Heat passenger compartment:

- "A/C button" is **not** activated during the heating process
- Close all side windows and doors
- Set air recirculation function.
- Select air distribution mode for footwell and defrosting.
- *On vehicles with CID:* In A/C menu (CID) in Air distribution index tab: select 100 % footwell for driver and front passenger and 100 % defrosting for driver (this applies here to driver and front passenger)
- Maximum temperature setting
- Maximum blower speed
- Start engine (does not apply for electric vehicles)

Cool down passenger compartment:

Switch on air conditioning compressor with "A/C button" at a vehicle interior temperature of 45 °C (measured at the head restraint).

On vehicles with MAX-AC button:

- Activation of MAX-AC (= maximum cooling power)

On vehicles without MAX-AC button:

- Set maximum cooling power by means of following steps:
 - Setting minimum temperature
 - Blower setting maximum
 - Stratification maximum cold (4 blue bars)
 - Only ventilation open
 - Close remaining flaps (air outlet **only** from centre fresh air grille, left and right)

After 5 min, measure both ventilation temperatures with a thermometer at the same time (centre, left and right fresh air grille). The measured temperature must be ≤ 16 °C and the difference between right and left may not be greater than 2 °C.

If one or both temperature specifications is not reached drain off heating and air conditioning system. Measure the amount of refrigerant drawn off and compare with the nominal fill amount.

Check whether refrigerant loss is present:

- If there is a permissible loss of refrigerant, fill the refrigerant circuit with the nominal fill amount.
- If there is an impermissible loss of refrigerant, check the refrigerant circuit for tightness. After rectifying the leak, fill the refrigerant circuit with the nominal fill amount.
- If there is no refrigerant loss, continue troubleshooting using the pressure measurement (only possible for vehicles with unregulated air conditioning compressor up to series E46/E53).



**Warning!**

Only persons in possession of a professional certificate of competence for the maintenance and repair of heating and air conditioning systems are authorised to carry out repair work on the refrigerant circuit. It must be available no later than 04 July 2010 (applies only to EU countries; follow country-specific regulations in non-EU countries).

Refrigerant circuit is under high pressure!

- If the protective caps on the filling valves are difficult to open, there is a danger of injury from leaking valve inserts.

Repair work may only be carried out on a depressurised refrigerant circuit!

- Before conducting repairs, check the actual pressure drop on the pressure gauge of the A/C service station.

Avoid contact with refrigerant and refrigerant oil.

- Follow safety information for handling R 134a refrigerant.
- Follow safety information for handling refrigerant oil.

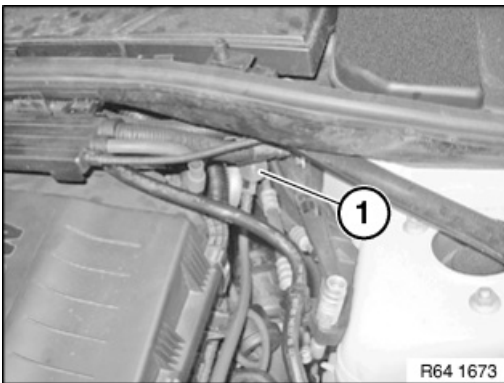
**Attention!**

The suction-side filling line of the refrigerant circuit is omitted from the engine versions of model series E9X and E8X.

This is replaced by a direction connection on the expansion valve.

Changeover time frame:

- From 07/09 - N54
- From 08/09 - N43
- Until end of 2009 - all other engine versions except N45/N46 and S65



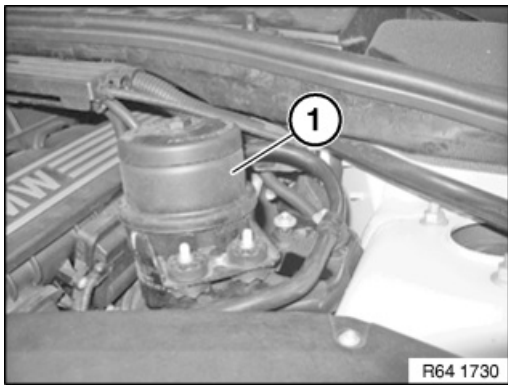
Shown on N54 engine by way of example.

Direct connection of filling adapter (1) on the expansion valve is shown.

Note:

Make sure filling hose (1) is laid without kinks.





Note:

N52 engine only:

On vehicles with hydraulic steering (e.g. AFS) oil reservoir (1) must be detached.

Refer to: Remove oil reservoir for hydraulic steering

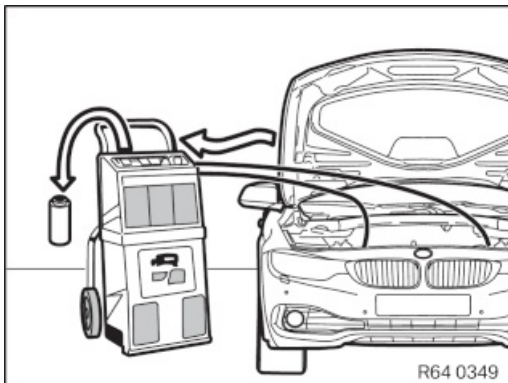


Attention!

Risk of damage!

Only BMW-approved R134a refrigerant may be used. (refer to sourcing reference: Operating Fluids)

Restart engine only when the air conditioning system has been correctly filled.



Attention!

Risk of damage!

Carefully move the climate service station!

Comply with the operating instructions and service interval for the A/C service station!

Make sure that the hoses of the A/C service station are drained after the drawing off or filling procedure!

The climate service station contains highly sensitive components, such as scales. These components will be damaged due to improper handling, such as fast driving over a bump. This will result in a significant reduction of the measuring accuracy when drawing off and filling.

Attention!

The vehicle must be parked on the floor during all drawing off, evacuation and filling procedures!

Filling a raised vehicle will result in insufficient filling levels.



Note:

In case of complaints, carry out a heating and air conditioning performance test!

If the system fails the test, draw off, evacuate and fill the heating and air conditioning system in accordance with the operating instructions of the relevant service station.

Service interval of service station must be adhered to.

E60 only:

If necessary, to connect service station, use manufacturer's adapter for high-pressure connection (red).





Instructions for drawing off heating and air conditioning system:

To help separation of refrigerant and refrigerant oil, run engine at low speed (800-1200 rpm) and with heating and air conditioning system turned on for a few minutes.

This limits the entrainment of refrigerant oil while it is drawn off.

Drawn-off refrigerant oil must be changed and reintroduced via the service station.

During drawing off, set the blower of the heating and air-conditioning unit to the middle blower speed. This ensures that drawing off is more effective since the pressure on the low pressure side increases.



Recycling:

Dispose of drawn-off refrigerant oil as hazardous waste.

Observe country-specific waste disposal regulations.



Attention!

E72 only:

Vehicle must be evacuated from both sides!



Instructions for evacuating heating and air conditioning system:

Before each filling, evacuate the refrigerant system.

Observe an evacuation time of at least 30 minutes.

The evacuation procedure removes all traces of ambient air, water vapour and any other gases present from the heating and air conditioning system. This enables subsequent system filling with refrigerant.

If the vacuum does not remain stable when the system is off, run the procedure for leaks in the refrigerant circuit.

During evacuation, set the blower of the heating and air-conditioning unit to the middle blower speed. This ensures that evacuation is more effective since the pressure on the low pressure side increases.

Instructions for filling heating and air conditioning system:

Before filling with refrigerant, replace the refrigerant oil entrained during drawing off.

Also top up any lost fluid as indicated in the table:

Loss of R134a refrigerant

Table 1 indicates the permitted loss of refrigerant after a specific period of time. There is no leak. Refrigerant oil must not be topped up.

Table 2 indicates the amount of refrigerant oil must be topped up with an unapproved loss of refrigerant due to a leak after a specific period of time.

Different cases:

- a. Loss of refrigerant per **Table 1** is not exceeded
 - Top up lost R134a refrigerant
 - It is not permitted to top up the refrigerant oil



- b. Loss of refrigerant per **Table 1** is exceeded
- Top up lost R134a refrigerant
 - refrigerant oil must be topped up **additionally** per Table 2

Table 1: Number of years since last filling	0 - 1	1 - 2	2 - 3	3 - 4	4 - 5
Permissible loss [g] → Do not top up refrigerant oil	≤ 30	≤ 60	≤ 90	≤ 120	≤ 150

Table 2: Number of years since last filling	R134a loss of coolant [g]	Top up quantity refrigerant oil
0 - 1	- <120	0
	120 - 150	10
	> 150	20
1 - 2	- <180	0
	180 - 210	10
	> 210	20
2 - 3	- <240	0
	240 - 270	10
	> 270	20
3 - 4	- <300	0
	300 - 330	10
	> 330	20
4 - 5	- <360	10
	> 360	20



Follow instructions for opening and part replacement in refrigerant circuit.

Depending on the type of component replaced on the heating and air conditioning system, it may be necessary to top up the refrigerant oil, even if no measurable losses have occurred during drawing off. Follow the notes provided by the heating and air conditioning system manufacturer, taking account of the tolerances (and inaccuracies) indicated in the operating instructions of the relevant service station.

Information on the required refrigerant fill quantity for the entire heating and air conditioning system is contained on the type plate (1) in the engine compartment.

If necessary, refer to the Technical Data for capacity.

Installation note:

Reseal refrigerant filler necks on vehicle with sealing caps.



64 50 010 Drawing off, evacuating and filling heating and air conditioning system (R1234yf)



Warning!

Only persons in possession of a professional certificate of competence for the maintenance and repair of heating and air conditioning systems are authorised to carry out repair work on the refrigerant circuit. It must be available no later than 04 July 2010 (applies only to EU countries; follow country-specific regulations in non-EU countries).

Refrigerant circuit is under high pressure!

- If the protective caps on the filling valves are difficult to open, there is a danger of injury from leaking valve inserts.

Repairs may only be carried out on a depressurised refrigerant circuit!

- Before conducting repairs, check the actual pressure drop on the pressure gauge of the A/C service station

Avoid contact with refrigerant and refrigerant oil.

- Observe safety information for handling refrigerant R1234yf
- Follow safety information for handling refrigerant oil.



Attention!

Risk of damage!

Only BMW-approved R1234yf refrigerant may be used (refer to sourcing reference: Operating Fluids).

Restart engine only when air conditioning has been correctly filled.





Vehicle-specific notes:

Only I01:



To access the connections for the refrigerant lines, remove front luggage compartment well.

Only I12:



Attention!

Risk of damage!

Risk of paint damage and scratches!

Open engine compartment lid to access the connections of the refrigerant lines.

Open and close the engine compartment lid as specified in the instructions without exception!

BMW i, Plug-in Hybrid Electric Vehicle and vehicles with rear passenger compartment air conditioning:

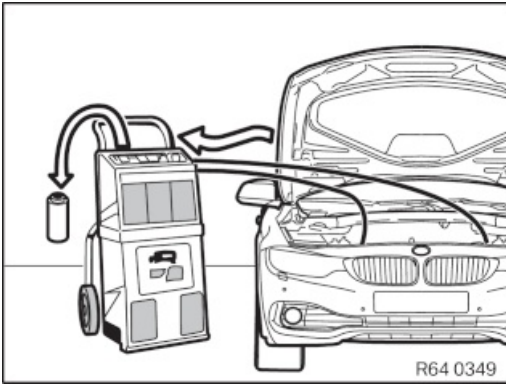


To ensure almost full draining of the refrigerant circuit or the hybrid battery cooling system, run the following test module:

- Body
- Air conditioning function
- Drain / fill the refrigerant circuit
- Drain/fill the refrigerant circuit (without I01 with heat pump)
- Drain/fill the refrigerant circuit of the heat pump (I01 with heat pump)

After filling the refrigerant circuit, delete the fault memory.





Attention!

For R1234yf, an A/C service station especially suited for this refrigerant must be used!

A/C service station for R134a must not be used!

Comply with the notes on refrigerant (R134a, R1234yf) and refrigerant oil (Sanden SP-A2).

Risk of damage!

Carefully move the climate service station!

Comply with the operating instructions and service interval for the A/C service station!

Make sure that the hoses of the A/C service station are drained after the drawing off or filling procedure!

The climate service station contains highly sensitive components, such as scales. These components will be damaged due to improper handling, such as fast driving over a bump. This will result in a significant reduction of the measuring accuracy when drawing off and filling.

Attention!

The vehicle must be parked on the floor during all drawing off, evacuation and filling procedures!

Filling a raised vehicle will result in insufficient filling levels.



Note:

Perform A/C performance test in event of customer complaint!

If the system fails the test, draw off, evacuate and fill the air conditioning in accordance with the operating instructions of the relevant service station.



Instructions for drawing off air conditioning:

Before evacuation, the A/C service station will investigate the refrigerant.

If the refrigerant is consistent with the requirements, evacuation is continued.

If the refrigerant fails to meet the requirements, then a special procedure must be complied with when drawing off and disposing of this refrigerant.

In order to enhance the separation of refrigerant and refrigerant oil, allow the Air conditioning to run for a few minutes before drawing off.

The limits the entrainment of refrigerant oil while it is drawn off.

Drawn-off refrigerant oil must be changed and reintroduced via the A/C service station.

During drawing off, set the blower of the heating and air-conditioning unit to the middle blower speed. This ensures that drawing off is more effective since the pressure on the low pressure side increases.





Recycling:

Dispose of drawn-off refrigerant oil as hazardous waste.

Observe country-specific waste disposal regulations.

Note in case of contaminated refrigerant R1234yf:

If the A/C service station for R1234yf refrigerant identifies contaminated refrigerant in the refrigerant circuit of the vehicle before evacuation, then a special procedure to draw off and dispose of this refrigerant must be followed.



Instructions for evacuating off air conditioning:

Before each filling, evacuate the refrigerant circuit.

Observe an evacuation time of at least 30 minutes.

The evacuation procedure removes all traces of ambient air, water vapour and any other gases present from the heating and air conditioning system. This enables subsequent system filling with refrigerant.

If the vacuum does not remain stable when the system is off, run the procedure for leaks in the refrigerant circuit.

During evacuation, set the blower of the heating and air-conditioning unit to the middle blower speed. This ensures that evacuation is more effective since the pressure on the low pressure side increases.

Notes for filling heating and air conditioning system:

In certain cases, Sanden SP-A2 refrigerant oil must be injected into the refrigerant circuit.

Before filling with refrigerant, replace the refrigerant oil entrained during drawing off.

Also top up any lost fluid as indicated in the table:

Loss of R1234yf refrigerant

Table 1 indicates the permitted loss of refrigerant after a specific period of time. There is no leak. refrigerant oil may not be topped up.

Table 2 indicates the amount of refrigerant oil must be topped up with an unapproved loss of refrigerant due to a leak after a specific period of time.

Different cases:

- a. Loss of refrigerant per **Table 1** is not exceeded
 - Top up lost R1234yf refrigerant
 - It is not permitted to top up the refrigerant oil
- b. Loss of refrigerant per **Table 1** is exceeded
 - Top up lost R1234yf refrigerant
 - refrigerant oil must be topped up **additionally** per Table 2

Table 1:	0 - 1	1 - 2	2 - 3	3 - 4	4 - 5
Number of years since last filling					
Permissible loss [g] --> Do not top up refrigerant oil	≤ 30	≤ 60	≤ 90	≤ 120	≤ 150

Table 2: Number of years since last filling	Loss of R1234yf refrigerant [g]	Top up quantity refrigerant oil
0 - 1	< 120	0
	120 - 150	10
	> 150	20
1 - 2	< 180	0
	180 - 210	10
	> 210	20
2 - 3	< 240	0
	240 - 270	10
	> 270	20
3 - 4	< 300	0
	300 - 330	10
	> 330	20
4 - 5	< 360	10
	> 360	20



Follow notes for opening and replacing parts in refrigerant circuit.

Depending on the type of component replaced on the heating and air conditioning system, it may be necessary to top up the refrigerant oil, even if no measurable losses have occurred during drawing off. Follow the notes provided by the air conditioning manufacturer, taking account of the tolerances (and inaccuracies) indicated in the operating instructions of the relevant service station.

Information on the required refrigerant capacity for the entire air conditioning is contained on the type plate (1) in the engine compartment.

If necessary, refer to the Technical Data for capacities.

Installation note:

Reseal refrigerant filler necks on vehicle with sealing caps.



64 50 ... Instructions for handling R 134a refrigerant

Warning!

Although R 134a at normal temperature is non-toxic, non-flammable and not explosive in air in any mixture ratio, it is still essential to follow various safety precautions.

The filled refrigerant circuit of the A/C system is subject to excess pressure. When carrying out repairs on the air conditioning, it is absolutely essential to draw off the refrigerant.

Do not weld or solder on to filled A/C systems or in rooms into which R 134a may have leaked. Exposure to flames or high temperatures ($\geq 50\text{ }^{\circ}\text{C}$) may give rise to toxic decomposition products (fluorine gas). For this reason, do not smoke either.

R 134a must be drawn off, cleaned and returned to the air conditioning with a service station following the relevant operating instructions.

Avoid all contact with liquid or gaseous R 134a. Wear safety goggles and gloves when working on the refrigerant circuit. R 134a acting on the skin can cause frostbite. Rinse affected body parts thoroughly with cold water. If R 134a gets into your eyes, likewise rinse with plenty of water and, if necessary, remove contact lenses if worn. Then seek immediate medical attention. Likewise seek immediate medical attention if you experience problems after inhaling R 134a fumes.

As a gas, R 134a is colourless, odourless and heavier than air. If it enters the atmosphere, this may result in an imperceptible danger of asphyxiation or in cardiac palpitations, especially in workshop pits. Ventilate rooms adequately; if necessary, turn on installed extractor systems.

For a properly functioning air conditioning, it is essential to have the greatest possible levels of cleanliness when working on the air conditioning and the best possible evacuation (at least 30 minutes dehumidification from refrigerant circuit) before each filling of the air conditioning.

R 134a absorbs moisture very easily. Therefore, seal off opened pipes, condenser, evaporator, compressor and dryer flask immediately with plugs.

With exchange parts, the plugs may only be removed immediately before the lines are connected.

In the event of warranty claims, the used parts must be provided with seal plugs to be able to determine the cause of the damage.

If an air conditioning has been completely drained by leakage, accident or repair, the drier element must be replaced as excessive moisture may have entered the system.

Store filled refrigerant pressure cylinders in such a way that they are not exposed to direct sunlight or other heat sources (max. $45\text{ }^{\circ}\text{C}$). Also avoid exposing them to mechanical stress (e.g. by dropping).

In the event of fire, carbon dioxide (CO_2), extinguishing powder and a sprayed water jet are deemed to be suitable extinguishants. Cool reservoirs at risk with a sprayed water jet (risk of bursting!).

Important!

After each refilling of an air conditioning, check that protective caps of filling valves are hand-tight. They serve as additional seals.



64 50 ... Instructions for handling R1234yf refrigerant

Work on the refrigerant circuit may only be carried out by experts!

Avoid all contact with liquid or gaseous R1234yf. Wear protective goggles and gloves when working on the refrigerant circuit.

- Follow safety information for handling refrigerant R1234yf!

Warning!

Although R1234yf at normal temperature is non-toxic, non-flammable and not explosive in air in any mixture ratio, it is still essential to follow various safety precautions. **At higher temperatures, R1234yf is inflammable.**

As a gas, R1234yf is colourless, odourless and heavier than air. If it enters the atmosphere, this may result in an imperceptible danger of asphyxiation or in cardiac palpitations, especially in workshop pits. Ventilate rooms adequately; if necessary, turn on installed extractor systems.

Store filled refrigerant pressure flasks so that they are not subject to direct sunlight or other heat sources (at maximum 45 °C). Also avoid exposing them to mechanical stress (e.g. by dropping).

Do not weld or solder on to filled air conditioning systems or in rooms into which R1234yf may have leaked. Exposure to flames or high temperatures (≥ 50 °C) may give rise to toxic products of decomposition (hydrofluoric acid). For this reason, do not smoke either.

In the event of fire, carbon dioxide (CO₂), extinguishing powder and a sprayed water jet are deemed to be suitable extinguishing agents. Cool reservoirs at risk with a sprayed water jet (risk of bursting!).

If the protective caps on the filler valves are difficult to open, there is a risk of injury from leaking valve inserts (high pressure).

The filled refrigerant circuit of the A/C system is subject to excess pressure. Before carrying out repairs on the A/C system, it is absolutely essential to draw off the refrigerant.

- Before conducting repairs, check the actual pressure drop on the pressure gauge of the A/C service station

R1234yf must be drawn off, cleaned and returned to the A/C system using an A/C service station following the relevant operating instructions.

For a properly functioning A/C system, it is essential to have the greatest possible levels of cleanliness when working on the A/C system and the longest possible evacuation (at least 30 minutes dehumidification from refrigerant circuit) before each filling of the A/C system.

R1234yf easily absorbs moisture. Therefore, seal off opened pipes, air conditioning condenser, evaporator, air conditioning compressor and dryer flask immediately with seal plugs.

- If air conditioning has been completely drained by a leak, accident or repair, the desiccant insert must be replaced as excessive moisture may have entered the system.

With replacement parts, the plugs may only be removed immediately before the lines are connected. In the event of warranty claims, the old parts must be provided with plugs to be able to determine the cause of the damage.

Installation note:

After each refilling of an air conditioning, check that protective caps of filling valves are hand-tight. They serve as additional seals.



**Warning!**

Observe the following points when handling refrigerant oil:

- Wear protective goggles.
- Wear protective gloves made from impermeable plastic.
- Do not swallow.
- Do not inhale.

Action to be taken after contact with refrigerant oil:

- After contact with eyes, rinse thoroughly with plenty of water and take out contact lenses (if worn). Then seek immediate medical attention.
- After contact with the skin, wash body parts affected with plenty of soap and water.
- Do not induce vomiting if oil is swallowed, seek immediate medical attention.
- If inhaled, introduce the person affected to fresh air. Seek medical attention if problems persist.

**Warning!**

refrigerant oil is non-combustible and non-explosive at normal temperatures. In spite of this, the following precautions must be observed:

- Do not store in the vicinity of flames, heat sources or strongly oxidising materials.
- Suitable extinguishants: Carbon dioxide (CO₂), dry extinguishant, foam.

**Important!**

refrigerant oil is hygroscopic and must therefore be stored in suitable containers that are sealed airtight!

**Recycling:**

Dispose of drawn-off refrigerant oil as hazardous waste.

Observe country-specific waste disposal regulations.

Absorb escaping refrigerant oil with fluid-binding material.

Notify the relevant authorities if larger amounts of refrigerant fluid are discharged into aboveground water supplies, drainage systems or subsoil.





Special tools required:

- 00 9 030
- 32 1 270

Warning!

- Avoid contact with refrigerant and refrigerant oil
- Follow safety information for handling R134a refrigerant
- Follow safety information for handling refrigerant oil

Attention!

- Always use new O-rings each time A/C connections are opened (refer to Electronic Parts Catalogue)
They must **not** be coated.
Use special tool 00 9 030 to install sealing rings without damaging them.
- Open the refrigerant circuit for as short of a period as possible.
- Close all components and lines in the refrigerant circuit and return parts **immediately** following the removals at openings with special tool 32 1 270 to prevent penetration of moisture or foreign objects.
- If the refrigerant circuit was closed at the openings with special tool 32 1 270 but it remains open for more than 24 hours, the dryer insert for the air conditioning must be replaced.

I. Part replacement as preliminary work for further repair work and based on gradual leakage. (minor leak, e.g. hairline crack)

Procedure:

- Draw off heating and air conditioning system, then determine drawn-off amount of refrigerant
- Carry out part replacement
- Replace removed refrigerant oil and additionally top up with new refrigerant oil according to components replaced:
 - Compressor: refer to Notes on compressor replacement
 - Evaporator: 10 ml
 - Condenser: 20 ml
 - Desiccant insert / dryer flask: 20 ml
 - Each replaced refrigerant line: 10 ml
 - Condenser with integrated dryer: 40 ml
 - Safety pressure switch and gasket: no additional refrigerant oil
- Evacuate and fill A/C system

II. Part replacement due to sudden leakage (major leak, e.g. pipe break due to accident)

Procedure:

- Draw off heating and air conditioning system, then determine drawn-off amount of refrigerant
- Carry out part replacement
- Replace removed refrigerant oil and additionally replace with new refrigerant oil according to parts replaced:
 - Compressor: refer to Notes on compressor replacement
 - Evaporator: 35 ml
 - Condenser: 35 ml
 - Desiccant insert / dryer flask: 55 ml
 - Each replaced refrigerant line: 35 ml
 - Condenser with integrated dryer: 55 ml
 - Safety pressure switch and gasket: no additional refrigerant oil



- Evacuate and fill A/C system



64 53 ... Instructions for replacement of air conditioning condensers and radiator/coolers

Attention!

Even when they are correctly installed or due to normal driving, radiators (oil cooler, radiator, charge air cooler) or air conditioning condensers may show slight impressions or deformations on their discs (1).

A slight sag with a large radius for the air conditioning condenser is also permissible.

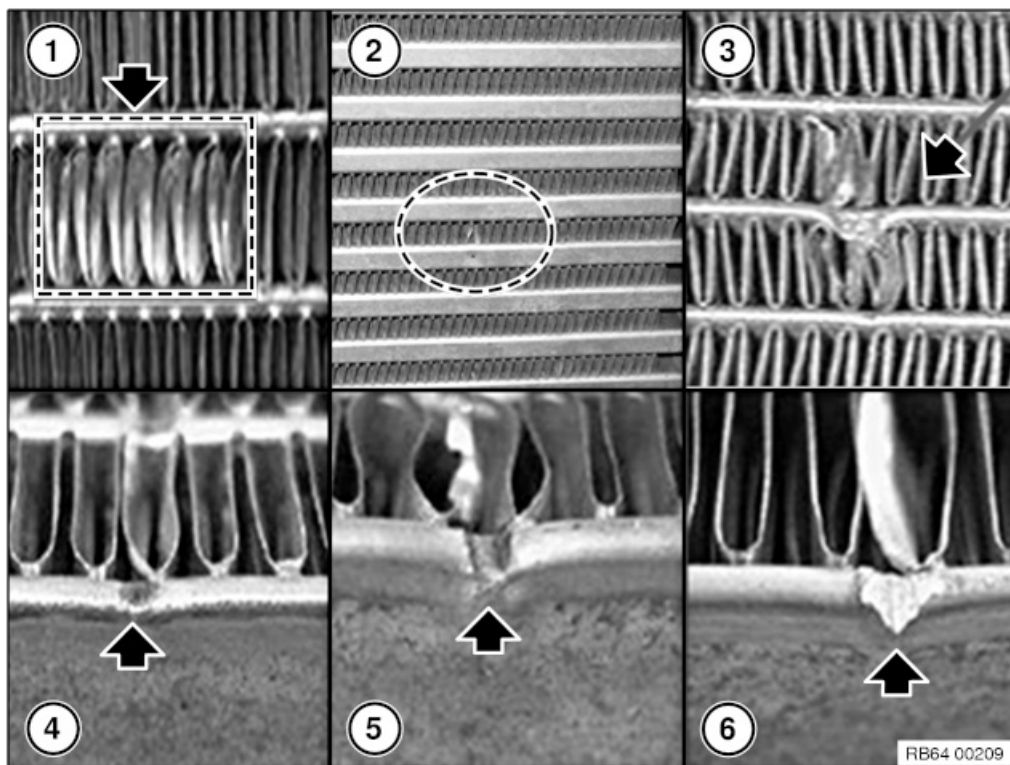
As long as tightness/function are not degraded and an adequate distance of a few mm between the radiator and air conditioning condenser remains in place, **this is not damage in either case.**

Radiators or air conditioning condensers are not to be replaced in these cases!

Note:

The deformations shown in Fig. (1) can be bent back with a standard fin comb..

Damage to lines carrying media or on the flat pipe require exchange of the radiator or air conditioning condenser (2-6).



Dryer flask (integrated in the air conditioning condenser):

Round dents/depressions are permitted.

The air conditioning condenser is not to be replaced in this case.



**Note:**

Leak detection with forming gas replaces the leak detection that is restricted in EU countries using UV.

Observe national regulations in all other countries!

**Attention!**

Compliance with the manufacturer's operating instructions provided in the equipment case is absolutely mandatory!

Comply with SI 08 08 10 (670)!

Read and comply with the manufacturer's operating instructions provided with the special tool particularly with regard to accident prevention, health protection and environmental protection.

Only the basic procedure is described in the following!

**Attention!**

Wear personal protective clothing/equipment!

**Note:**

Determine the customer's use behaviour prior to leak detection!

Certain user behaviours can lead to a loss of refrigerant from the refrigerant circuit even if there is no leak. This may occur if the customer has not used the air conditioning for a period of more than six months. This may cause O-rings to harden and refrigerant may escape. In this case, it will be sufficient to fill the refrigerant circuit again and switch on the air conditioning for approximately 10 minutes while the engine is running.





Necessary preliminary work:

- **If components of the refrigerant circuit are contaminated, clean the engine compartment. Otherwise, the sensor head of the leak detector will become contaminated.**

Comply with notes and instructions on handling high pressure cleaner.

- Drain off air conditioning system
- Fill the air conditioning with forming gas
- Set pressure to 5 bar

To reach the components of the refrigerant circuit with leak detector, specific parts must be removed depending on the vehicle.

Remove the following parts first immediately before the check of the respective components:

- Drive belt from air conditioning compressor
- Centre fresh air grille
- Covers
- Trim panels
- Air duct
- Intake silencer
- Bulkheads
- Parts of the interior equipment (automatic rear air-conditioning system)

In some vehicles it is necessary to open the air flaps of the automatic air flap control.





Vehicle-specific notes:

Only I01:



To access the connections for the refrigerant lines, remove front luggage compartment well.

Only I12:



Attention!

Risk of damage!

Risk of paint damage and scratches!

Open engine compartment lid to access the connections of the refrigerant lines.

Open and close the engine compartment lid as specified in the instructions without exception!

Only BMW i and hybrid vehicles:



To ensure almost full draining of the refrigerant circuit or the hybrid battery cooling system, run the following test module:

- Body
- Air conditioning function
- Drain / fill the refrigerant circuit
- Drain / fill the refrigerant circuit
- Drain/fill refrigerant circuit of heat pump (only I01 with heat pump)

Delete fault memory after filling refrigerant circuit.



**Attention!**

Always perform the leak detection with a pressure of **5 bar at first!**

This is absolutely necessary to find certain leaks, such as in the area of the O-rings.

If no leak is detected, repeat the leak detection with **10 bar**.

Attention!

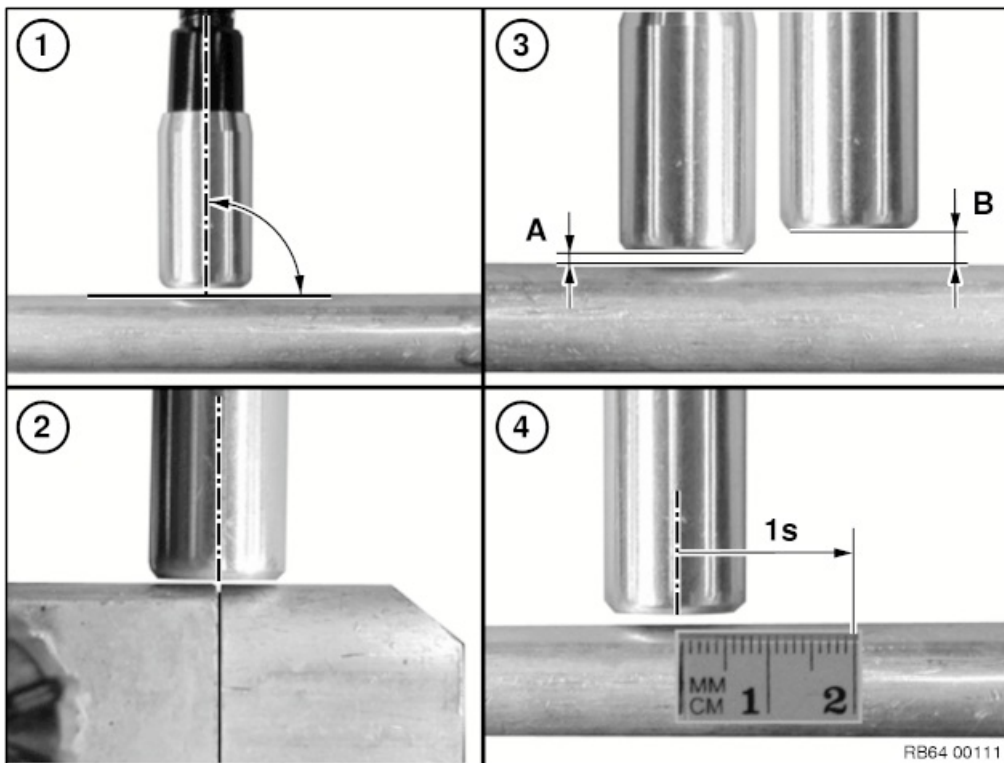
The leak detection may not be performed **more than 3 h** after filling the refrigerant circuit with forming gas!

Forming gas consists of 95% nitrogen and 5% hydrogen. The leak detector will detect hydrogen. If this is leaking from the refrigerant circuit even though the pressure remains, the leak detection bears no results.

Attention!**Risk of damage!**

Maximum approved pressure: **10 bar**

Do not start the engine during the entire procedure!

**Notes for handling the leak detector:**

1. Sensor head should always stand vertical to the surface to be checked.
2. Sensor head must always be aligned to the centre of the point to be checked. Slowly guide the sensor head around the point (e.g. connection point, sealing surface, etc.).
3. The optimal distance (A) between sensor head and surface to be checked should permanently be approximately 1 mm.
Maximum distance (B) at points that are difficult to access approximately 5 mm.
4. Checking speed may not be more than maximum 2 cm per s.

**Note:**

If the leak detector displays a leak, remove the sensor head from the leak for approximately 10 s. Then check if the leak is still displayed at the same point. Repeat the process up to three times, to ensure that a leak is actually present at this point.





Note:

Replace the leaking component. Relieve the pressure from the refrigerant circuit prior to replacement.

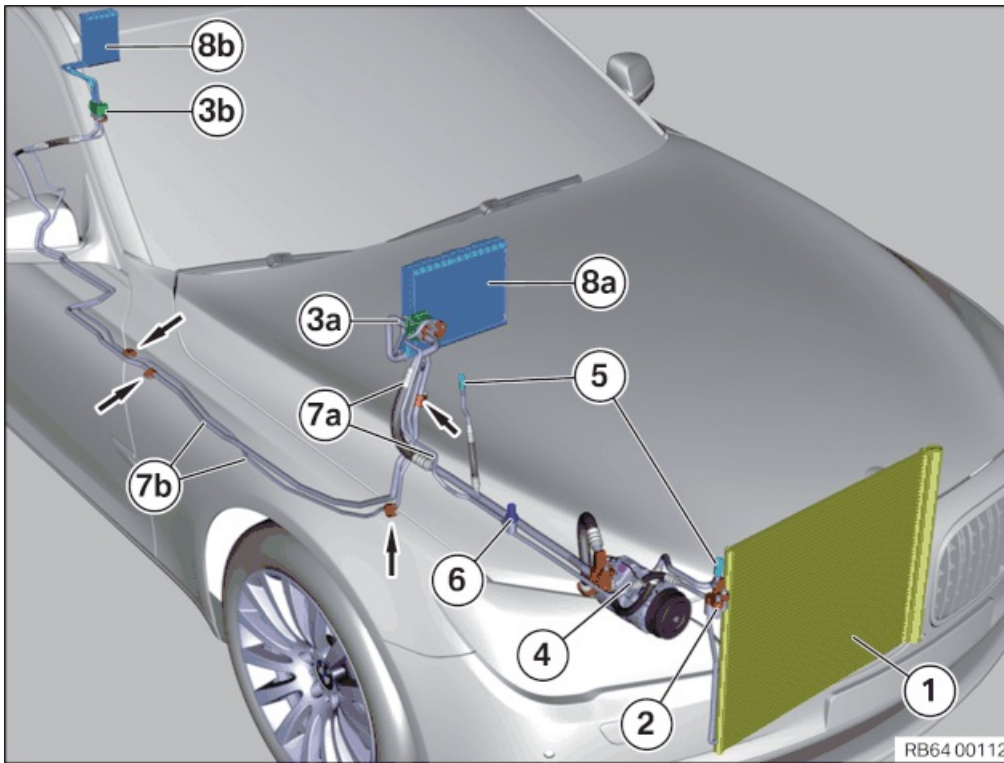


Attention!

Compliance with the instructions above is absolutely mandatory!

Non-compliance will significantly reduce the efficiency of leak detection!





Note:

The graphic shows the example of the refrigerant circuit on the F02 with the automatic rear air-conditioning system optional equipment .

Refrigerant circuits on other vehicles may differ from the graphic.

Refrigerant circuits of BMW i vehicles differ a lot from the figure:

Overview components refrigerant circuit I01

Overview components refrigerant circuit I12

Note additional components during leak detection in these vehicles!

Overview of positions to be checked:

1. Air conditioning condenser
2. Connection point between air conditioning condenser and refrigerant line
3. a) Expansion valve, front (vehicles with and without automatic rear air-conditioning system)
b) Expansion valve, rear (vehicles with automatic rear air-conditioning system)
4. Air conditioning compressor
5. Filler neck high pressure and low pressure
6. Refrigerant pressure sensor
7. a) Refrigerant line, front (vehicles with and without automatic rear air-conditioning system)
b) Refrigerant line, rear (vehicles with automatic rear air-conditioning system)
8. a) Evaporator, front (vehicles with and without automatic rear air-conditioning system)
b) Evaporator, rear (vehicles with automatic rear air-conditioning system)



Note:

Refrigerant line connection points are identified by arrows.



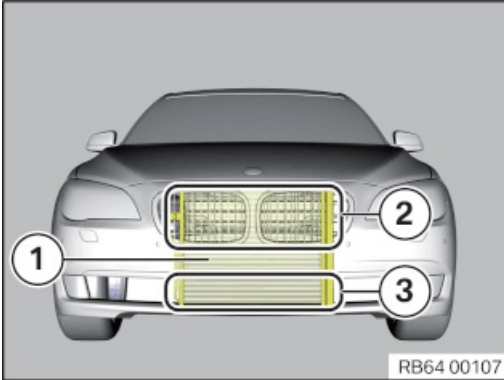


Checking sequence:

1. Check of components 1, 2, 3a, 4, 5, 6, 7a and 8a of the automatic front air-conditioning system.

If no fault found:

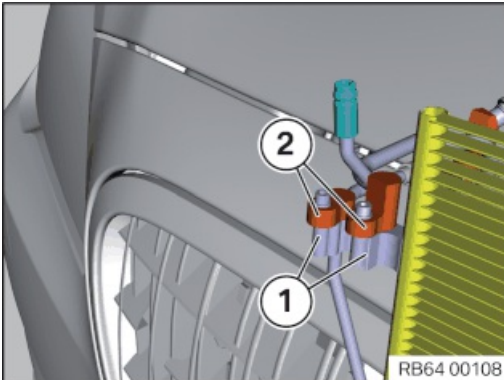
2. Check of components 3b, 7b, 8b and connection points of the automatic rear air-conditioning system.



1. Air conditioning condenser:

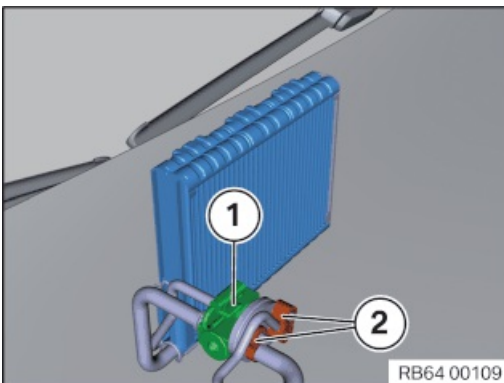
Damage caused by stone chipping, etc. is the most frequent cause of air conditioning condenser leaks (1):

1. Visual inspection in the area of the radiator grille (2) and air inlet grille, centre (3).
2. Check damaged points first.
3. Check the remainder of the air conditioning condenser.



2. Connection point condenser - refrigerant line

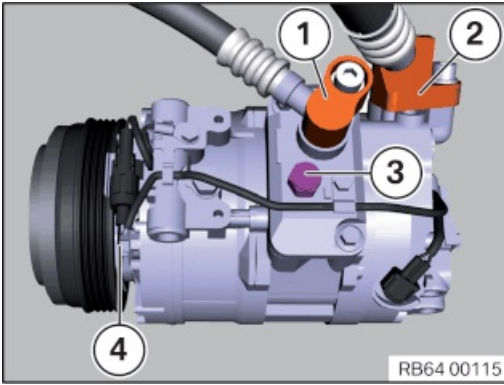
Check the connection point between the connection at the air conditioning condenser (1) and refrigerant lines (2).



3. Expansion valve:

Check the connection point between the expansion valve (1) and refrigerant lines (2).



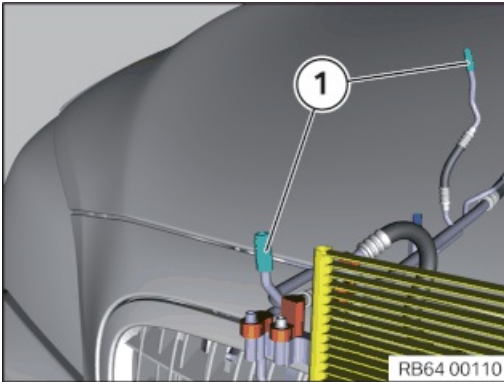


4. A/C compressor:

Remove drive belt from air conditioning compressor.

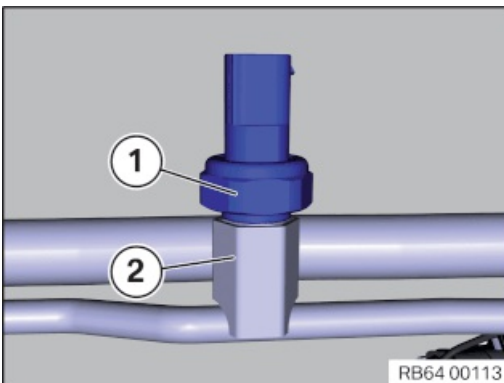
Check the following components on the air conditioning compressor:

1. High-pressure connection
2. Low pressure connection
3. Pressure relief valve
4. Radial shaft seal of the magnetic coupling: Turn the magnetic coupling several times by hand during the leak detection.



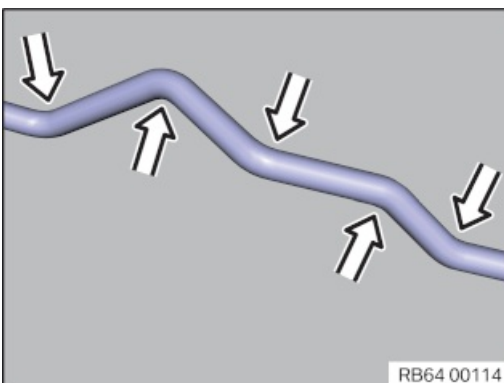
5. Filler neck

Blow out the fuel filler neck (1) prior to checking.



6. Refrigerant pressure sensor

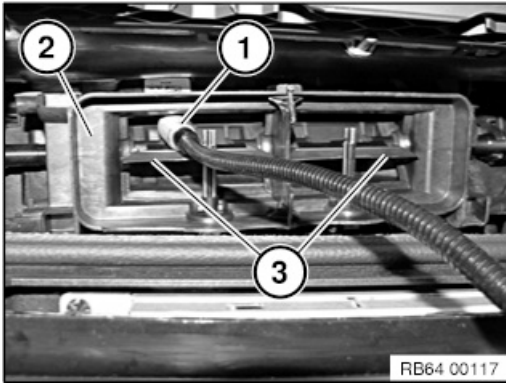
Check the sealing surface between the refrigerant pressure sensor (1) and the refrigerant line (2).



7. Refrigerant lines:

1. Perform visual inspection
2. Check damaged points first.
3. Check bending points at points marked with an arrow. Leaks occur especially frequently at these points.
4. Check the remainder of the refrigerant line.





8. Evaporator:

Remove the centre fresh air grille.

Compliance with the following settings is **absolutely** required:

- Air recirculation function On
- Lowest blower speed
- Lowest temperature
- Set the air distribution to ventilation (air may only flow out of the centre fresh air grille)

Position sensor head (1) in air duct of middle fresh air grille (2) as illustrated and move slowly from inside to outside above and below air flap (3). Carry out this operation on the left and right fresh air grilles.



Attention!

Some vehicles have an expansion valve directly next to the fresh air intake for the passenger compartment.

In this case the expansion valve must be covered!



Following the completed leak detection:

- Evacuate and fill heating and air conditioning system



64 50 ... Leak detection with ultraviolet additives (UV additives) (BMW leak-testing case)



Leak detection using ultraviolet additives is generally not recommended as the UV additives lead to an uncontrolled over oiling of the refrigerant circuit. This results in a reduction of the cooling power. Leak detection with forming gas is preferable.

Leak detection using ultraviolet additives is permitted for refrigerants R134a and R1234yf.

Attention!

In EU countries it is prohibited by law to fill a knowingly leaking refrigerant circuit with the refrigerants (R134a and R1234yf):

- If a leak is suspected in the refrigerant circuit, refilling with refrigerant and UV additives for the purpose of a subsequent leak detection **is not permitted**

In this case carry out leak detection with forming gas

- UV additives **must be filled only in a tight refrigerant circuit**

Observe national regulations in all other countries!



Attention!

It is absolutely essential to read and comply with the equipment manufacturer's operating instructions provided in the leak testing case!

Read and comply with the manufacturer's operating instructions provided with the leak testing case with regard to accident prevention, health protection and environmental protection.

Use only BMW-approved UV additives (e.g. TRACER).

Only the basic procedure is described in the following!

Attention!

UV additives may not be used in vehicles with electric A/C compressors!



Warning!

Avoid contact with refrigerant.

Follow safety precautions when handling refrigerant.

Attention!

Ultraviolet lamp gets very hot in the radiation area!

Do not use the ultraviolet lamp without the filter glass.

Eyes and skin will suffer damage if the ultraviolet lamp is used without the filter glass.

When using the UV lamp, wear the safety goggles provided in the case.





Note:

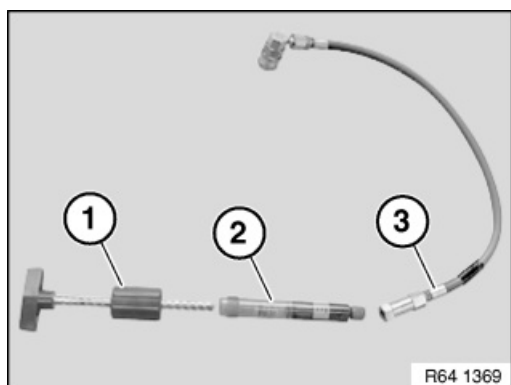
- Fill the hose system of the hand pump completely with UV additive **PRIOR** to use
- Use the UV additive exclusively for refrigerant oil approved by BMW
- Do not operate the air conditioning while the hand pump is connected or in use
- The air conditioning must always be filled with an adequate amount of refrigerant to enable the UV additives to be properly distributed



Necessary preliminary work:

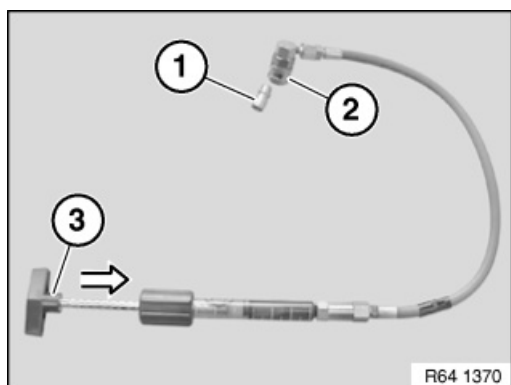
Before actually testing for leaks, check the entire refrigerant circuit using the UV leak detection lamp to ensure that no UV additive is already in the area of the refrigerant circuit.

If already illuminated areas are found, carefully clean the area in question with the cleaning agent contained in the leak testing case.



On initial use:

Connect hand pump (1) to additive cartridge (2) and pipe section (3).



On initial use:

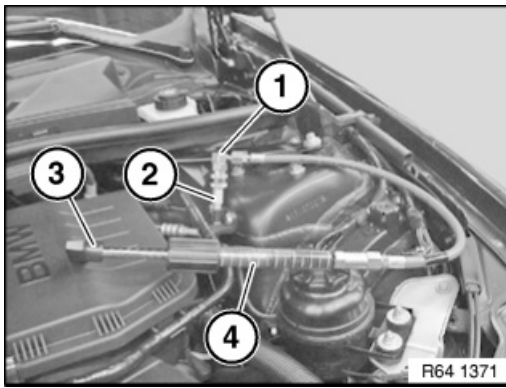
Attach vent valve (1) to quick-release coupling (2).

Turn handle (3) on hand pump to advance the piston until a small amount of UV additive emerges. This vents the hose system.

Attention!

The entire hand pump with hose system must not be disassembled again once filling has been completed.





Attach quick-release coupling (1) to low-pressure connection (2) of air conditioning system.

Turn handle on hand pump (3) until the required amount of UV additive is added.

The quantity of UV additive to be added is dependent on the amount of refrigerant in the refrigerant circuit:

- Air conditioning systems with refrigerant filling up to 900 g: one graduation mark (4) on additive cartridge
- Air conditioning systems with refrigerant filling in excess of 900 g: two graduation marks (4) on additive cartridge

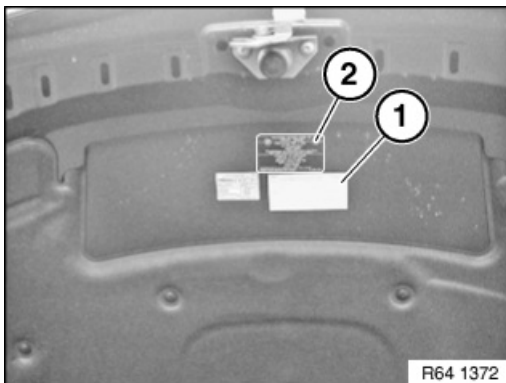
Note:

After filling remove the quick-release coupling (1). If necessary, clean the areas with contaminated with UV additive using the cleaning agent contained in the leak testing case.



Further tasks:

- Start engine
- Run air conditioning at highest level for 5 - 10 minutes in order to ensure adequate distribution of dye in the system
- Turn off engine.
- Check all components of the refrigerant circuit for possible leaks
- Possible leaks are displayed in luminous green



Complete accompanying information label (1) with the relevant data and attach in an easily visible position next to the type plate (2).



**Attention!**

Specific to the country , 2 different refrigerants (R134a, R1234yf) are used.

Specific to the country, the vehicle and the year of manufacture 2 different refrigerant oils (ND-8, Sanden SP-A2) are used.

Before carrying out repairs on the refrigerant circuit, always determine which refrigerant/refrigerant oil is used in the vehicle!

Refrigerant: This information can be found on the **type plate** on the bonnet.

Refrigerant oil: This information can be found on the **type plate** on the front flap in vehicles with a production date from 2013.



**R1234yf refrigerant is used in the following countries:**

Observe notes on handling R1234yf refrigerant!

Europe				Asia	America
Belgium	Great Britain	Malta	Sweden	Israel	USA
Bosnia and Herzegovina	Ireland	Macedonia	Switzerland	Turkey	Canada
Bulgaria	Iceland	The Netherlands	Slovakia	India*	
Denmark	Italy	Norway	Slovenia	South Korea	
Germany	Croatia	Austria	Spain		
Estonia	Latvia	Poland	Czech Republic		
Finland	Liechtenstein	Portugal	Hungary		
France	Lithuania	Romania	Cyprus		
Greece	Luxembourg	Serbia			

*Only applies to vehicle models with Europe version. All other vehicle models have R134a.

Introduction of R1234yf refrigerant:

European countries listed in the table, Turkey and Israel:

- BMW i as of 09/2013
- from 07/2016, BMW, MINI, RR

USA and Canada:

- from 07/2016 BMW, BMW i, MINI

South Korea:

- from 11/2018 BMW, BMW i, MINI

The introduction date may vary slightly according to the specific country and model.

The refrigerant R134a will continue to be used **in all other countries**.

Observe notes on handling R134a refrigerant!





Refrigerant oil Sanden SP-A2 is used for both, R1234yf and R134a.

Observe notes on handling refrigerant oil!



Attention!

I01, I12 with production date up to 08/2014:

In the national-market version with R134a a wrong refrigerant oil is present on the type plate

Always use Sanden SP-A2

(Part number of Sanden SP-A2: 2 339 920)

Attention!

Only vehicles with a production date from 09/2013 and **R1234yf** refrigerant/Sanden **SP-A2** refrigerant oil can be filled using the A/C service station for **R1234yf**.

In addition to vehicles with a production date from 09/2013, also all previous vehicles **without the electric A/C compressor** with **R134a** refrigerant and both **ND-8** and Sanden **SP-A2** refrigerant oil can be filled using the A/C service station for **R134a**.

Exception:

BMW i and hybrid vehicles (with an electric A/C compressor) that are filled with **R134a** refrigerant/Sanden **SP-A2** refrigerant oil. These vehicles must be injected with Sanden **SP-A2** refrigerant oil.

When filling the refrigerant circuit with R134a, always ensure you use the correct, vehicle-specific refrigerant oil type!

The previous ND-8 refrigerant oil must not be mixed with Sanden SP-A2 refrigerant oil!

In other words, the refrigerant oil ND-8 must not be filled in refrigerant circuits which were filled with Sanden SP-A2 in the factory.

Sanden SP-A2 refrigerant oil may be mixed with ND-8 refrigerant oil in vehicles without an electric A/C compressor.

In other words, the refrigerant oil Sanden SP-A2 must be filled in refrigerant circuits which were filled with ND-8 in the factory.

However, this is permitted **only** in vehicles **starting from F-series**.

Note the overview of the refrigerant oil to be filled.

To prevent inadmissibly mixing the different refrigerant oil types, rinse the A/C service station hoses after each drawing off/filling procedure!



**Warning!**

Danger of injury!

Refrigerant circuit is under high pressure! Work on the refrigerant circuit may only be carried out by experts!

Draw off refrigerant without fail **BEFORE** all repair work on the refrigerant circuit.

The refrigerant circuit is depressurised **AFTER** drawing off.

- The pressure gauge on the A/C service unit must be checked for the actual pressure drop prior to repair work.

It is absolutely essential to read and observe the relevant operating instructions for the A/C service unit used!

At high temperatures, R1234yf is inflammable!

**Protective measures/rules of conduct:**

- Wear safety goggles
- Wear oil-resistant protective gloves
- Do not smoke!
- Observe country-specific safety regulations.

**First aid measures:**

- Eye contact: In the event of contact with the eyes, rinse immediately with plenty of running water and consult an ophthalmologist.
- Skin contact: In the event of contact with skin, remove affected clothing immediately and rinse with plenty of water.
- After inhalation: If refrigerant vapours are inhaled in greater concentrations, remove the person affected to an area of fresh air and keep them under supervision. Call for a doctor. If breathing problems are experienced, breathe additional oxygen. If the person affected is breathing with difficulty or has stopped breathing, incline the person's head at the neck and administer the kiss of life.



**Warning!**

Danger of injury!

Refrigerant circuit is under high pressure! Work on the refrigerant circuit may only be carried out by experts!

Draw off refrigerant without fail BEFORE all repair work on the refrigerant circuit.

The refrigerant circuit is depressurised AFTER drawing off!

It is absolutely essential to read and observe the relevant operating instructions for the A/C service unit used!

**Protective measures/rules of conduct:**

- Wear safety goggles
- Wear oil-resistant protective gloves
- Do not smoke!
- Observe country-specific safety regulations.

**First aid measures:**

- If swallowed: Do NOT induce vomiting, unless expressly instructed to do so by medical personnel. Do not administer anything to an unconscious person through their mouth. Consult a doctor immediately if larger quantities of this substance are swallowed. Loosen tight-fitting items of clothing (e.g. collar, tie, belt or similar).
- Eye contact: Remove contact lenses if worn. In the event of eye contact, rinse eyes for at least 15 minutes with plenty of water. It is essential to use WARM WATER. Consult a doctor.
- Skin contact: In the event of skin contact, rinse immediately with plenty of water. Remove contaminated clothes and shoes. Wash affected clothes before wearing again. Clean shoes thoroughly before reusing. **Call for a doctor.**
- After inhalation: If inhaled, take the person affected outside into fresh air immediately and keep them under supervision. **Call for a doctor.** If breathing difficulties are experienced, administer additional oxygen. If the person affected stops breathing, administer the kiss of life.

**Recycling**

Catch and dispose of emerging refrigerant oil.

Observe country-specific waste disposal regulations.



**Warning!**

Danger of injury!

Refrigerant circuit is under high pressure! Work on the refrigerant circuit may only be carried out by experts!

Draw off refrigerant without fail BEFORE all repair work on the refrigerant circuit.

The refrigerant circuit is depressurised AFTER drawing off!

It is absolutely essential to read and observe the relevant operating instructions for the A/C service unit used!

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- Do not smoke!
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- Eye contact: In the event of contact with the eyes, rinse immediately with plenty of running water and consult an ophthalmologist.
- Skin contact: In the event of contact with skin, remove affected clothing immediately and rinse with plenty of water.
- After inhalation: If refrigerant vapours are inhaled in greater concentrations, remove the person affected to an area of fresh air and keep them under supervision. Call for a doctor. If breathing problems are experienced, breathe additional oxygen. If the person affected is breathing with difficulty or has stopped breathing, incline the person's head at the neck and administer the kiss of life.



**Note:**

The AircoMatic II evaporator cleaning system (by WYNNNS)* is recommended for eliminating unpleasant noises in the refrigerant circuit.

The evaporator cleaning unit can be obtained via the BMW Workshop Equipment Catalogue.

Information on operation and correct usage of the evaporator cleaning system can be obtained from the relevant operating instructions.

**Necessary preliminary tasks:**

Before cleaning, remove microfilter between blower and evaporator.

Failure to do this poses the risk of premature filter wear and cleaning will be unsuccessful.

- Remove microfilter

Installation note:

Check condition of microfilter before installation. Replace microfilter if necessary.





Special tools required:

- 00 9 030
- 32 1 270

Warning!

- Avoid contact with refrigerant and refrigerant oil
- Follow safety information for handling R134a refrigerant
- Follow safety information for handling refrigerant oil

Attention!

- Always use new O-rings each time A/C connections are opened (refer to Electronic Parts Catalogue)
They must **not** be coated.
Use special tool 00 9 030 to install sealing rings without damaging them.
- Open the refrigerant circuit for as short of a period as possible.
- Close all components and lines in the refrigerant circuit and return parts **immediately** following the removals at openings with special tool 32 1 270 to prevent penetration of moisture or foreign objects.
- If the refrigerant circuit was closed at the openings with special tool 32 1 270 but it remains open for more than 24 hours, the dryer insert for the air conditioning must be replaced.

I. Part replacement as preliminary work for further repair work and based on gradual leakage. (minor leak, e.g. hairline crack)

Procedure:

- Draw off heating and air conditioning system, then determine drawn-off amount of refrigerant
- Carry out part replacement
- Replace removed refrigerant oil and additionally top up with new refrigerant oil according to components replaced:
 - Compressor: refer to Notes on compressor replacement
 - Evaporator: 10 ml
 - Condenser: 20 ml
 - Desiccant insert / dryer flask: 20 ml
 - Each replaced refrigerant line: 10 ml
 - Condenser with integrated dryer: 40 ml
 - Safety pressure switch and gasket: no additional refrigerant oil
- Evacuate and fill A/C system

II. Part replacement due to sudden leakage (major leak, e.g. pipe break due to accident)

Procedure:

- Draw off heating and air conditioning system, then determine drawn-off amount of refrigerant
- Carry out part replacement
- Replace removed refrigerant oil and additionally replace with new refrigerant oil according to parts replaced:
 - Compressor: refer to Notes on compressor replacement
 - Evaporator: 35 ml
 - Condenser: 35 ml
 - Desiccant insert / dryer flask: 55 ml
 - Each replaced refrigerant line: 35 ml
 - Condenser with integrated dryer: 55 ml
 - Safety pressure switch and gasket: no additional refrigerant oil



- Evacuate and fill A/C system



**Special tools required:**

- 00 9 030
- 64 1 140

**Warning!**

Danger of injury!

Refrigerant circuit is under high pressure!

Follow safety instructions for handling R 134a refrigerant.

Avoid contact with refrigerant and refrigerant oil.

Follow safety information for handling refrigerant oil.

**Important!**

Risk of damage!

Restart engine only when A/C system has been correctly filled.

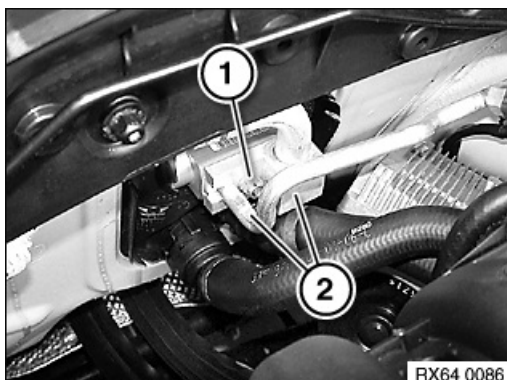
Follow instructions for opening and replacing parts in refrigerant circuit.

Note:

If air conditioning system is opened for more than 24 hours: Replace desiccant insert for heating and air conditioning system.

**Necessary preliminary tasks:**

- Draw off refrigerant from air conditioning system
- Remove suction filter housing.
- **N47 only:** Remove right charge-air duct



Slacken nut (1).

Disconnect refrigerant lines (2).

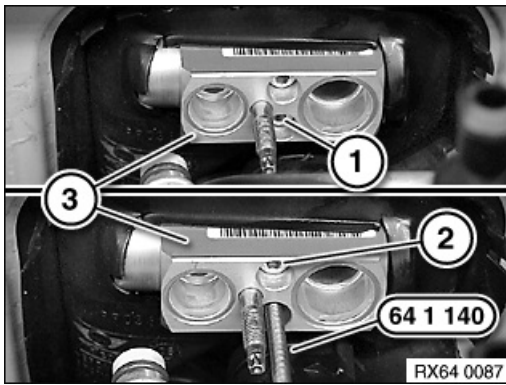
Tightening torque 64 11 4AZ.

Installation note:

Replace sealing rings.

Use special tool 00 9 030 to mount sealing rings without damaging them.





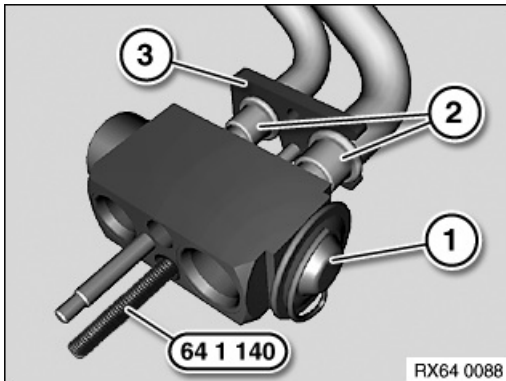
Release screw (1) and screw in special tool 64 1 140 .

Release screw (2) and feed out expansion valve (3) towards front.

Tightening torque 64 11 5AZ.

Installation note:

Make sure expansion valve is correctly seated on seal.



Installation note:

Replace all sealing rings on twin pipes (2).

Use special tool 00 9 030 to mount sealing rings without damaging them.

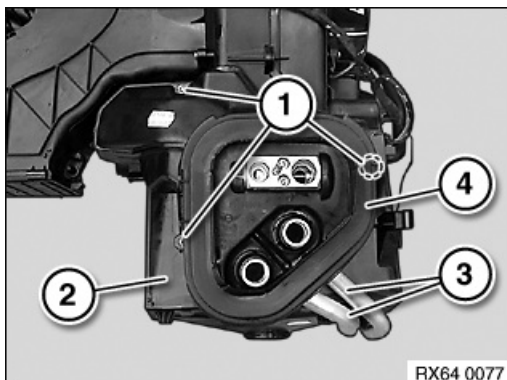
Carefully insert expansion valve (1).

Grip mounting plate (3) with special tool 64 1 140 and secure expansion valve (1) with a screw.



**Necessary preliminary tasks:**

- Remove heater
- Remove heating element

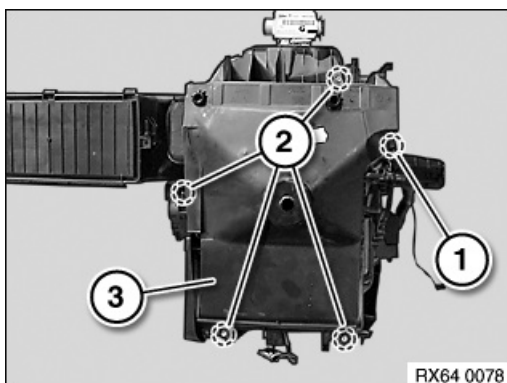


Release screws (1).

Remove cover (2) with twin pipes (3) and gasket (4).

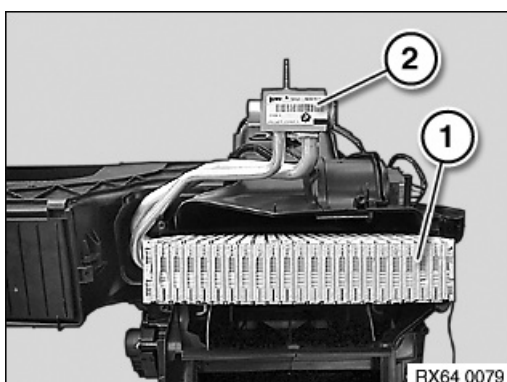
Installation note:

Ensure gasket (4) is correctly seated.



Disconnect plug connection from temperature sensor (1).

Release screws (2) and remove cover (3).



Remove evaporator (1).

Replacement:

Remove expansion valve (2).





Special tools required:

- 00 9 030
- 32 1 270

Warning!

- Avoid contact with refrigerant and refrigerant oil
- Follow safety information for handling R134a refrigerant
- Follow safety information for handling refrigerant oil

Attention!

- Always use new O-rings each time A/C connections are opened (refer to Electronic Parts Catalogue)
They must **not** be coated.
Use special tool 00 9 030 to install sealing rings without damaging them.
- Open the refrigerant circuit for as short of a period as possible.
- Close all components and lines in the refrigerant circuit and return parts **immediately** following the removals at openings with special tool 32 1 270 to prevent penetration of moisture or foreign objects.
- If the refrigerant circuit was closed at the openings with special tool 32 1 270 but it remains open for more than 24 hours, the dryer insert for the air conditioning must be replaced.

I. Part replacement as preliminary work for further repair work and based on gradual leakage.
(minor leak, e.g. hairline crack)

Procedure:

- Draw off heating and air conditioning system, then determine drawn-off amount of refrigerant
- Carry out part replacement
- Replace removed refrigerant oil and additionally top up with new refrigerant oil according to components replaced:
 - Compressor: refer to Notes on compressor replacement
 - Evaporator: 10 ml
 - Condenser: 20 ml
 - Desiccant insert / dryer flask: 20 ml
 - Each replaced refrigerant line: 10 ml
 - Condenser with integrated dryer: 40 ml
 - Safety pressure switch and gasket: no additional refrigerant oil
- Evacuate and fill A/C system

II. Part replacement due to sudden leakage
(major leak, e.g. pipe break due to accident)

Procedure:

- Draw off heating and air conditioning system, then determine drawn-off amount of refrigerant
- Carry out part replacement
- Replace removed refrigerant oil and additionally replace with new refrigerant oil according to parts replaced:
 - Compressor: refer to Notes on compressor replacement
 - Evaporator: 35 ml
 - Condenser: 35 ml
 - Desiccant insert / dryer flask: 55 ml
 - Each replaced refrigerant line: 35 ml
 - Condenser with integrated dryer: 55 ml
 - Safety pressure switch and gasket: no additional refrigerant oil



- Evacuate and fill A/C system



64 52 ... Notes for changing the air conditioning compressor, determining the amount of refrigerant oil (amount of refrigerant oil of new air conditioning compressor known)



Note:

This procedure only applies if the **new air conditioning compressor has a label with the amount of refrigerant oil.**

A different procedure applies for air conditioning compressors **without a label indicating the amount of refrigerant oil.**



Attention!

Risk of damage!

Remove the air conditioning compressor without damaging and without the use of force!

Air conditioning compressors with plastic belt pulleys:

- Avoid impacts/knocks to plastic belt pulley (caused by tools, contact with base).
- Return faulty air conditioning compressors in their original packaging only and with sealed connected branches.



Attention!

In the event of a mechanical air conditioning compressor failure and the resulting ingress of chips into the refrigerant circuit, replace the following parts:

- Air conditioning compressor
- Air conditioning condenser
- Desiccant insert
- Line to the air conditioning condenser
- Refrigerant oil
- BMW i, PHEV: all expansion valves

BMW i, PHEV:

- Rinse the refrigerant circuit





All vehicles without I01 with heat pump:

The new air conditioning compressor is filled at the factory with refrigerant oil.

The amount of refrigerant oil in the new air conditioning compressor corresponds to the amount of refrigerant oil for the entire new and unfilled refrigerant circuit.

Only I01 with heat pump:

The new air conditioning compressor and new dryer flask are filled at the factory with refrigerant oil.

The amount of refrigerant oil in the new air conditioning compressor and in the new dryer flask corresponds to the amount of refrigerant oil for the entire new and unfilled refrigerant circuit.

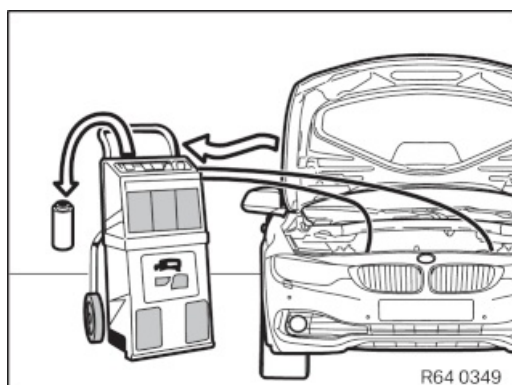


When replacing the air conditioning compressor it is absolutely essential to adapt the amount of refrigerant oil in accordance with the instructions below!

BMW I01with heat pump: An adaptation is also required for the replacement of the dryer flask.

An adaptation of the amount of refrigerant oil is not required in the following cases:

- Replacement of the complete refrigerant circuit.
- If the refrigerant circuit was rinsed (only BMW i, PHEV).



Step 1:

Determination of the amount of refrigerant oil drawn off from the refrigerant circuit:

- Draw off A/C system.
- Note down the amount of refrigerant oil shown on the A/C service station display.



When evacuating the air conditioning system, refrigerant oil is also extracted and collected in the oil separator of the A/C service station. This amount of refrigerant oil is displayed after the extraction of the air conditioning on the display of the A/C service station.





The refrigerant oil amount specification is located on the label on the air conditioning compressor.

The position of the label can vary depending on the air conditioning compressor.

Information about the amount of refrigerant oil is provided on the label in g, ml or cc.

ml are specified throughout these repair instructions for adjusting the amount of refrigerant oil, as g or cc closely correspond to ml.

Step 2:

Compare information of amount of refrigerant oil of the present and new air conditioning compressor:

- Read and record amount of refrigerant oil specified on the previous air conditioning compressor.
(If there is no label, continue with **Step 3, Case 1**.)
- Read and record amount of refrigerant oil specified on the new air conditioning compressor.
- Compare both amounts of refrigerant oil with each other.

Different cases:

1. The information of the amount of refrigerant oil on the present and new air conditioning compressor **is the same**. In this case continue with **Step 3, Case 1**.
2. The information of the amount of refrigerant oil on the present and new air conditioning compressor **is not the same**:

Different cases:

1. Information of the amount of refrigerant oil on the present air conditioning compressor **is higher** than the information of the amount of refrigerant oil on the new air conditioning compressor:
Difference is not taken into account. In this case continue with **Step 3, Case 1**.
2. Information of the amount of refrigerant oil on the present air conditioning compressor **is lower** than the information of the amount of refrigerant oil on the new air conditioning compressor:
Generate and record the difference between both amounts of refrigerant oil. After that continue with **Step 3, Case 2**.

Example:

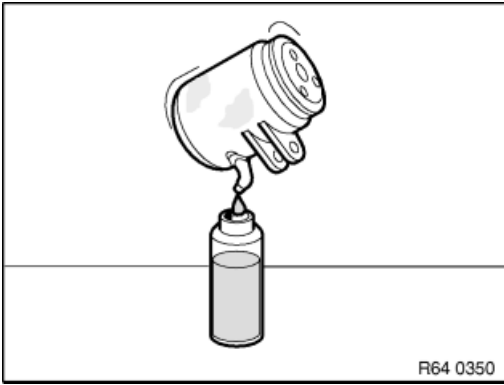
Information of the amount of refrigerant oil of present air conditioning compressor 110 g

Information of the amount of refrigerant oil of new air conditioning compressor 150 g

$150 \text{ g} - 110 \text{ g} = 40 \text{ g}$ correspond to almost 40 ml

Note the difference of 40 ml.





Step 3:

Determination of the amount of refrigerant oil in the new air conditioning compressor:

- Transfer all of the refrigerant oil remaining in the previous air conditioning compressor into a measuring cup via the oil filler plug.
- Turn the belt pulley during the filling process. This allows more refrigerant oil to flow out of the previous air conditioning compressor.
- Read the amount of refrigerant oil at the measuring cup.

Different cases:

Case 1:

- **Add 10 ml precautionary allowance** to the read amount of refrigerant oil.
- Note **at least but a total of 50 ml**.

Example:

20 ml read at measuring cup:

$20\text{ ml} + 10\text{ ml precautionary allowance} = 30\text{ ml} < 50\text{ ml}$

determined amount of refrigerant oil for new air conditioning compressor = 50 ml

Case 2:

- Add the **10 ml precautionary allowance** to the read amount of refrigerant oil.
- Add **the difference to that**.
- Note **at least but a total of 50 ml**.

Example:

Difference = 40 ml

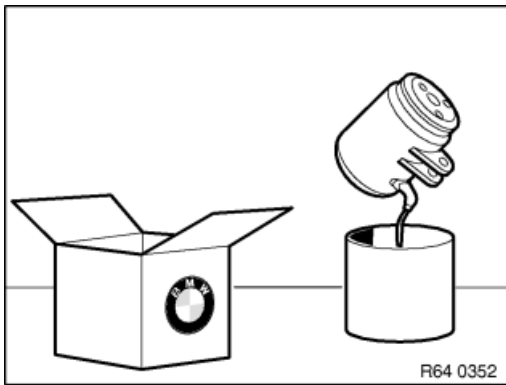
20 ml read at measuring cup:

$20\text{ ml} + 10\text{ ml precautionary allowance} = 30\text{ ml}$

$30\text{ ml} + 40\text{ ml difference} = 70\text{ ml} > 50\text{ ml}$

determined amount of refrigerant oil for new air conditioning compressor = 70 ml





Step 4:

Determination of the amount of refrigerant oil to be drained from the new air conditioning compressor:

- Open oil filler plug. Tightening torque 64 52 2AZ.
- Drain the following amount of refrigerant oil from the new air conditioning compressor into a clean measuring cup:

Amount of refrigerant oil to be drained from the new air conditioning compressor = amount of refrigerant oil on the label of the new air conditioning compressor - determined amount of refrigerant oil in the new air conditioning compressor

Example:

Amount of refrigerant oil stated on the label of the new air conditioning compressor: 150 ml

determined amount of refrigerant oil of the new air conditioning compressor: 50 ml

Amount of refrigerant oil to be drained = 150 ml - 50 ml = 100 ml

100 ml must be drained from the new air conditioning compressor.



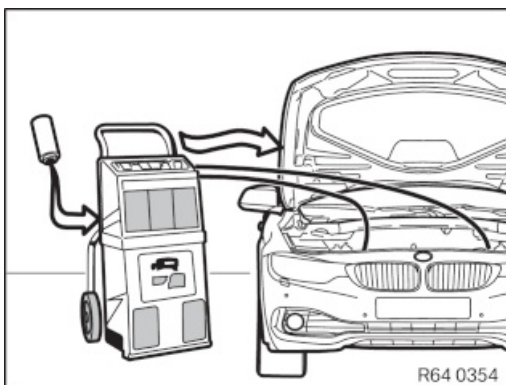
The drained new refrigerant oil can be filled into the expansion tank of the A/C service station after draining.



If the new, drained refrigerant oil is not filled straight away into the expansion tank of the A/C service station, it must be disposed of properly.



On account of its hygroscopic properties, refrigerant oil must not be stored in open collecting vessels.



Step 5

Fill the refrigerant circuit with the correct amount of refrigerant and refrigerant oil:

- Reassemble the vehicle.
- Evacuate Air conditioning.
- Before filling the air conditioning with refrigerant, again fill in the quantity of refrigerant oil noted in Step 1 as previously drawn off into the system.
- Fill A/C system.





Step 6



Attention!

Risk of damage!

During initial operation of a new air conditioning compressor, it is absolutely essential to carry out the following breaking-in procedure.

Do not exceed idle speed.

Note:

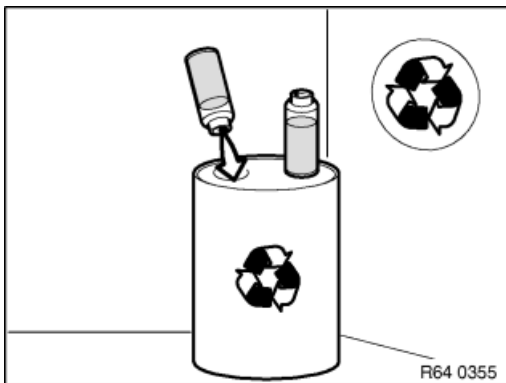
The breaking-in procedure for the new air conditioning compressor can be carried either manually or with the diagnosis system.

Manual:

- Switch off the air conditioning.
- Set all ventilation outlets in the instrument panel to "OPEN".
- Start engine and let it stabilise at idle speed.
- Set the blower output to a minimum of 75% of the maximum blower output.
- Switch on the air conditioning and allow the engine to run at idle speed for a minimum of 2 minutes.

Carry out the following service function with the diagnosis system:

- Body
- Heating and air conditioning functions
- Run-in protection for A/C compressor



Step 7

Dispose off the drawn off refrigerant oil:

- The refrigerant oil drawn off from the oil separator of the A/C service station and from the previous air conditioning compressor **must not be reused and must be correctly disposed of.**

Observe country-specific waste disposal regulations.



Installation note:

If the refrigerant circuit is open for longer than 24 hours:

- Replace desiccant insert



64 52 ... Notes on changing the air conditioning compressor, determining the amount of refrigerant oil (amount of refrigerant oil of new air conditioning compressor not known)



Note:

This procedure only applies if the **new air conditioning compressor does not have a label with the amount of refrigerant oil.**

A different procedure applies for air conditioning compressors with a label indicating the amount of refrigerant oil.



Attention!

Risk of damage!

Remove the air conditioning compressor without damaging and without the use of force!

Air conditioning compressors with plastic belt pulleys:

- Avoid impacts/knocks to plastic belt pulley (caused by tools, contact with base).
- Return faulty air conditioning compressors in their original packaging only and with sealed connected branches.



Attention!

In the event of a mechanical air conditioning compressor failure and the resulting ingress of chips into the refrigerant circuit, replace the following parts:

- Air conditioning compressor
- Air conditioning condenser
- Desiccant insert
- Line to the air conditioning condenser
- Refrigerant oil



The new air conditioning compressor is filled at the factory with refrigerant oil.

The amount of refrigerant oil in the new air conditioning compressor corresponds to the amount of refrigerant oil for the entire new and unfilled refrigerant circuit.

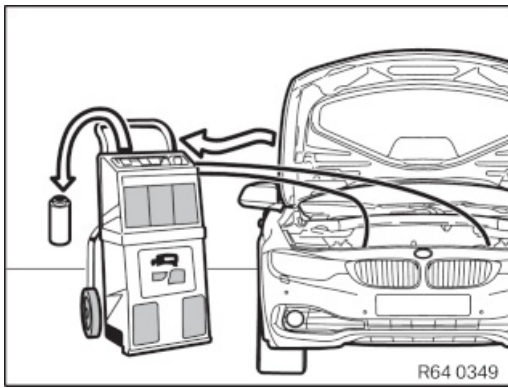


When replacing the air conditioning compressor it is absolutely essential to adapt the amount of refrigerant oil in accordance with the instructions below!

An adjustment of the amount of refrigerant oil is not required in the following case:

- Replacement of the complete refrigerant circuit.



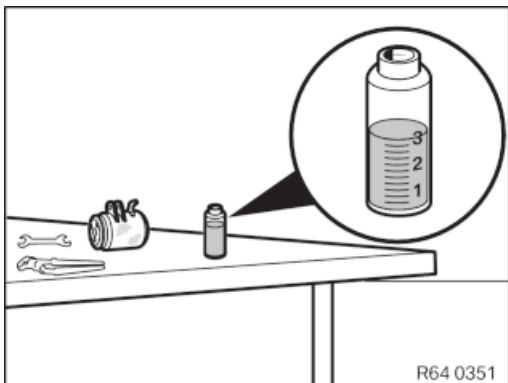


- Draw off A/C system.
- Note down the amount of refrigerant oil shown on the A/C service station display.

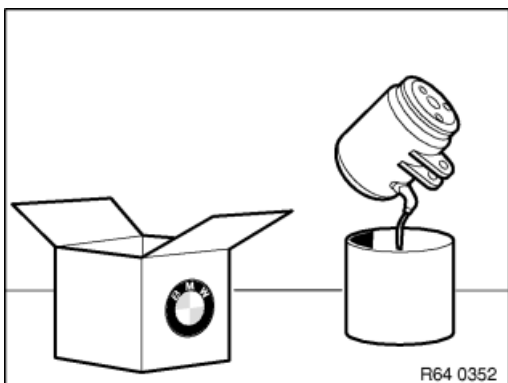
i When evacuating the air conditioning system, refrigerant oil is also extracted and collected in the oil separator of the A/C service station. This amount of refrigerant oil is displayed after the extraction of the air conditioning on the display of the A/C service station.



- Transfer all of the refrigerant oil remaining in the previous air conditioning compressor into a measuring cup via the oil filler plug.
- Turn the belt pulley during the filling process. This allows more refrigerant oil to flow out of the previous air conditioning compressor.

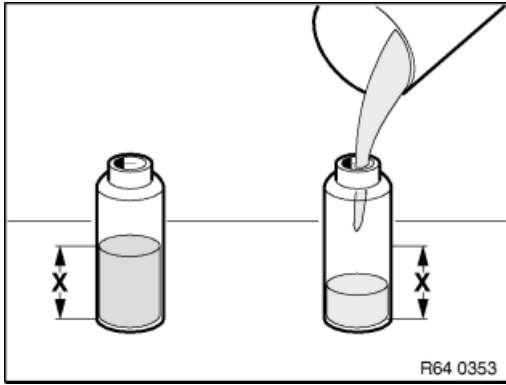


- Read the amount of refrigerant oil at the measuring cup.



- Open oil filler plug. Tightening torque 64 52 2AZ.
- Fill the entire contents of the new air conditioning compressor in a clean collecting vessel.





- Fill the same quantity of refrigerant oil (from the new air conditioning compressor), as was drained from the present air conditioning compressor, **+ 10 ml precautionary allowance** in a clean measuring cup and again fill it in the new air conditioning compressor . **At least but a total of 50 ml.**

Example:

20 ml read at measuring cup:

20 ml + 10 ml precautionary allowance = 30 ml < 50 ml

determined amount of refrigerant oil for new air conditioning compressor = 50 ml



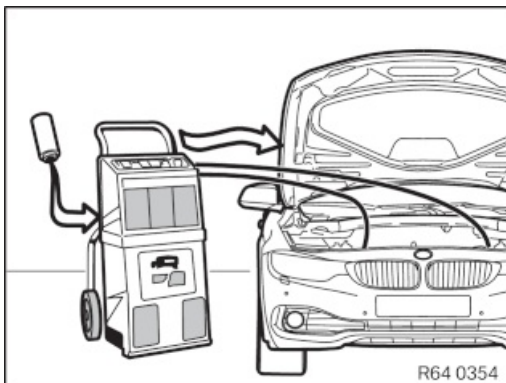
The drained new refrigerant oil can be filled into the expansion tank of the A/C service station after draining.



If the new, drained refrigerant oil is not filled straight away into the expansion tank of the A/C service station, it must be disposed of properly.



On account of its hygroscopic properties, refrigerant oil must not be stored in open collecting vessels.



- Reassemble the vehicle.
- Evacuate Air conditioning.
- Before filling the air conditioning with refrigerant, fill in the noted quantity of refrigerant oil previously drawn off, into the system.
- Fill A/C system.





Attention!

Risk of damage!

During initial operation of a new air conditioning compressor, it is absolutely essential to carry out the following breaking-in procedure.

Do not exceed idle speed.

Note:

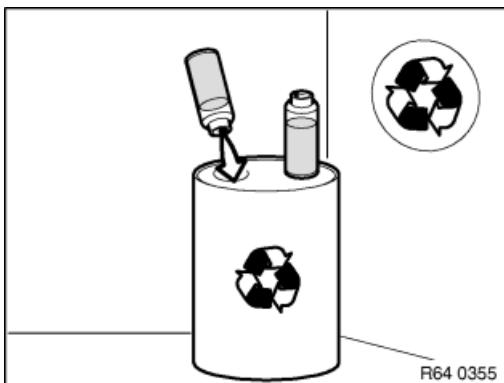
The breaking-in procedure for the new air conditioning compressor can be carried either manually or with the diagnosis system.

Manual:

- Switch off the air conditioning.
- Set all ventilation outlets in the instrument panel to "OPEN".
- Start engine and let it stabilise at idle speed.
- Set the blower output to a minimum of 75% of the maximum blower output.
- Switch on the air conditioning and allow the engine to run at idle speed for a minimum of 2 minutes.

Carry out the following service function with the diagnosis system:

- Body
- Heating and air conditioning functions
- Run-in protection for A/C compressor



- The refrigerant oil drawn off from the oil separator of the A/C service station and from the previous air conditioning compressor **must not be reused and must be correctly disposed of**.
- Observe country-specific waste disposal regulations.



Installation note:

If the refrigerant circuit is open for longer than 24 hours:

- Replace desiccant insert



64 52 521 Removing and installing/replacing air conditioning compressor (N14, N16, N18)



Special tools required:

- 00 9 030
- 32 1 270



Warning!

Avoid contact with refrigerant and refrigerant oil.
Follow safety informations for handling R 134a refrigerant.
Follow safety informations for handling refrigerant fluid.



Important!

Risk of damage!
Restart engine only when A/C system has been correctly filled.
Read and comply with notes on compressor replacement.
If air conditioning system is opened for more than 24 hours:
Replace desiccant insert for A/C system



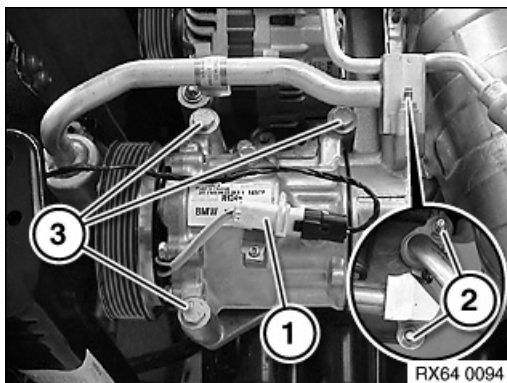
Necessary preliminary tasks:

- Drawing off, evacuating and filling the air conditioning are not included in the time value given for this job item
- Remove the alternator drive belt



Important!

Seal openings or lines on compressor with special tool 32 1 270 to prevent escape of media and dirt contamination.



Important!

Secure compressor against falling out.

Disconnect plug connection (1).

Release nuts (2) and disconnect refrigerant lines.

Tightening torque 64 52 2AZ.

Installation note:

Replace sealing rings.

Use special tool 00 9 030 to install sealing rings without damaging them.

Release bolts (3) and feed out compressor.

Tightening torque 64 52 1AZ.





Installation note:

- If the air conditioning has been opened for more than 24 hours, the desiccant insert must be replaced
- Evacuate and fill air conditioning system



61 00 ... Safety information on handling hybrid cars

1. Qualification:

All repair work on high-voltage components may **only be performed by specially trained personnel** (qualification: Work on high-voltage inherently safe vehicles) must be performed by qualified technicians. Each hybrid car requires additional vehicle specific training with training achievement controls.

Required training is offered by the BMW Training Academy.

2. Identification:

Observe **warning notices** on high-voltage components. When replacing individual high-voltage components, check if warning stickers are present. Independently attaching warnings is only allowed on the locations provided for them. Use only approved and appropriately identified original new parts.

3. Rules of conduct/protective measures:

- Note operating instructions for handling high-voltage battery units.
- Do not under any circumstances touch open high-voltage cables and high-voltage components on damaged vehicle before shutting down the high-voltage electrical system.
- In the event of damage (mechanical, thermal) transition metal oxides, carbon, electrolyte solvents and their products of decomposition may be released.
Suitable acid-resistant protective clothing/equipment must therefore be used when handling the vehicle!

- Hand protection: Gloves
- Eye protection: Safety goggles

Damaged high-voltage battery units must be stored in an acid-resistant pan in a location in the open that is protected against the weather (sun, rain) and secured against unauthorised access. Do not inhale escaping gasses.

- Prevent escaping substances from entering drains, pits and the sewer system.
- Collect any material that is discharged and have it disposed of according to the work instruction, wear acid-resistant protective clothing when doing so.
- Notify the fire brigade if fire breaks out, clear the area immediately and make accident scene safe. Attempt to extinguish the fire without putting persons in danger (suitable extinguishant: water and water foam).
- A cut 2nd emergency separation point must be repaired with a butt connector.

4. Measures before starting work:

- Each job on the vehicle must be assigned by appropriately trained personnel. Before work is started, this electrician must place the vehicle in the operating condition required to perform the relevant activity. The qualified personnel's instructions and directions absolutely must be followed. **No work may be carried out without this qualified personnel being consulted first.**
- It is **not** permitted to work on the high voltage system or on high voltage components while the engine is running.
- The readiness to drive must be ended before shutting off the voltage of the high-voltage system. The readiness to drive is ended when the driver is absent only under the following conditions:
 1. seat belt buckle unlocked **and**
 2. the driver's door is open **and**
 3. no brake activated **and**
 4. the accelerator pedal is not activated **and**
 5. speed < 3 km/h (2 mph)
- Work on live high-voltage components is expressly prohibited. Before each operation on the high-voltage system, the system must be isolated from the power supply by qualified personnel (high-voltage safety connector Off) and secured against unauthorised recommissioning (padlock).
- After each deactivation of the high-voltage system, it is essential to observe a **waiting period** of at least **10 seconds** prior to further work.
- Before beginning work, it is mandatory to check that the equipment is de-energised and is protected against being energised again.
Work is only permitted to begin if:
 1. Corresponding display in the KOMBI **High-voltage system deactivated** orWhen a high-voltage warning is active (indicator light, Check Control, etc.), it is essential to determine and eliminate the cause of this warning via the diagnosis system before continuing with any other work.
If it cannot be definitively established that the equipment is de-energised, work is not permitted to begin. **Danger to life!** Before work begins, a qualified electrician (1000 V AC) must verify that the



system is de-energised using appropriate measuring devices and procedures.

=> In this case, Technical Support must be contacted!

- Do not perform any work on the vehicle while it is charging. Before starting work, disconnect the charging cable from the vehicle.
Battery charging may result in heating of the high-voltage battery unit. This heating may lead to sporadic launches of the electric fan (switch-on request from the electric fan). Therefore, work in the vicinity of the electric fan during the charging procedure is prohibited. Ensure freedom of movement of the battery charge lines in the vicinity of the electric fan.

5. *Measures during/after activities:*

- Identifiable mechanical damage to or tampering with high-voltage components must be reported immediately to the qualified personnel in charge.
- When carrying out any work on the high-voltage system, it is prohibited to drive externally all the drivetrain components (wheels, gearbox, drive shafts, etc.).
- *E72 only:* When the "Power Electronic Box Cover" is removed, the high-voltage system is not permitted to be activated. The high-voltage service disconnect must only be used when the "Power Electronics Box Cover" is completely installed.
- High-voltage cables (orange coating) and their connectors and stop parts **may not** be repaired. If damaged, a cable must always be replaced completely.
- When working in the vicinity of high-voltage components (identified accordingly with warning stickers and orange-coloured coating), protect these components against damage.
- The specified work steps in the repair instructions must be adhered to exactly.
- High-voltage components and their holders must be screwed/bolted to the defined tightening torque. Tightening torques and tightening specifications must be observed.
- Connecting high-voltage components to body ground is crucial to safety for reasons of equipotential bonding. For this reason, it is prohibited to operate any high-voltage components without them being correctly connected to body ground. The measurements (insulation/potential equalisation measurement) are performed automatically by the vehicle. Manual measurement is not therefore necessary.
For a correct earthing connection, the retaining elements of high-voltage components must not be painted. Follow further painting notes.
- Removed high-voltage battery units must be stored in a manner that protects them from misuse and damage.
- Damaged or warning stickers that are no longer legible on high-voltage components must always be replaced.

6. *Potential compensation:*

Equipotential bonding lines, high-voltage cables and the battery negative lead to the EME are fitted with safety screws.

- Clean contact faces and have then checked by a second person.
- Tighten down screws/bolts to specified torque.
- Have tightening torque checked by a second person.
- Both persons must document that the work has been carried out correctly in the vehicle records.



64 53 ... Instructions for desiccant insert replacement



Special tools required:

- 32 1 270

A desiccant insert that is in a correctly functioning, sealed heating and air conditioning system does **not** have to be changed at regular service-inspection intervals.

However, the dryer flask or desiccant insert must absolutely be replaced in the event of:

- contamination of the refrigerant with swarf (e.g. when the compressor is clamped).
- With depressurised and/or completely drained refrigerant circuit.
- With a refrigerant circuit, which was closed using special tool 32 1 270 but remains open for more than 24 hours.

The desiccant insert cannot be replaced in the following vehicles:

- 1-Series E8x, 3-Series E9x from 12/2008
- E84, E89
- 1-Series F2x, 3-Series F3x
- BMW i 01 without heat pump

In these vehicles, the condenser for the heating and air conditioning system must be replaced.

- BMW i 01 with heat pump

On this vehicle the low pressure battery must be replaced.





Special tools required:

- 00 9 030
- 32 1 270

Warning!

- Avoid contact with refrigerant and refrigerant oil
- Follow safety information for handling R134a refrigerant
- Follow safety information for handling refrigerant oil

Attention!

- Always use new O-rings each time A/C connections are opened (refer to Electronic Parts Catalogue)
They must **not** be coated.
Use special tool 00 9 030 to install sealing rings without damaging them.
- Open the refrigerant circuit for as short of a period as possible.
- Close all components and lines in the refrigerant circuit and return parts **immediately** following the removals at openings with special tool 32 1 270 to prevent penetration of moisture or foreign objects.
- If the refrigerant circuit was closed at the openings with special tool 32 1 270 but it remains open for more than 24 hours, the dryer insert for the air conditioning must be replaced.

I. Part replacement as preliminary work for further repair work and based on gradual leakage.
(minor leak, e.g. hairline crack)

Procedure:

- Draw off heating and air conditioning system, then determine drawn-off amount of refrigerant
- Carry out part replacement
- Replace removed refrigerant oil and additionally top up with new refrigerant oil according to components replaced:
 - Compressor: refer to Notes on compressor replacement
 - Evaporator: 10 ml
 - Condenser: 20 ml
 - Desiccant insert / dryer flask: 20 ml
 - Each replaced refrigerant line: 10 ml
 - Condenser with integrated dryer: 40 ml
 - Safety pressure switch and gasket: no additional refrigerant oil
- Evacuate and fill A/C system

II. Part replacement due to sudden leakage
(major leak, e.g. pipe break due to accident)

Procedure:

- Draw off heating and air conditioning system, then determine drawn-off amount of refrigerant
- Carry out part replacement
- Replace removed refrigerant oil and additionally replace with new refrigerant oil according to parts replaced:
 - Compressor: refer to Notes on compressor replacement
 - Evaporator: 35 ml
 - Condenser: 35 ml
 - Desiccant insert / dryer flask: 55 ml
 - Each replaced refrigerant line: 35 ml
 - Condenser with integrated dryer: 55 ml
 - Safety pressure switch and gasket: no additional refrigerant oil



- Evacuate and fill A/C system



64 53 ... Instructions for replacement of air conditioning condensers and radiator/coolers

Attention!

Even when they are correctly installed or due to normal driving, radiators (oil cooler, radiator, charge air cooler) or air conditioning condensers may show slight impressions or deformations on their discs (1).

A slight sag with a large radius for the air conditioning condenser is also permissible.

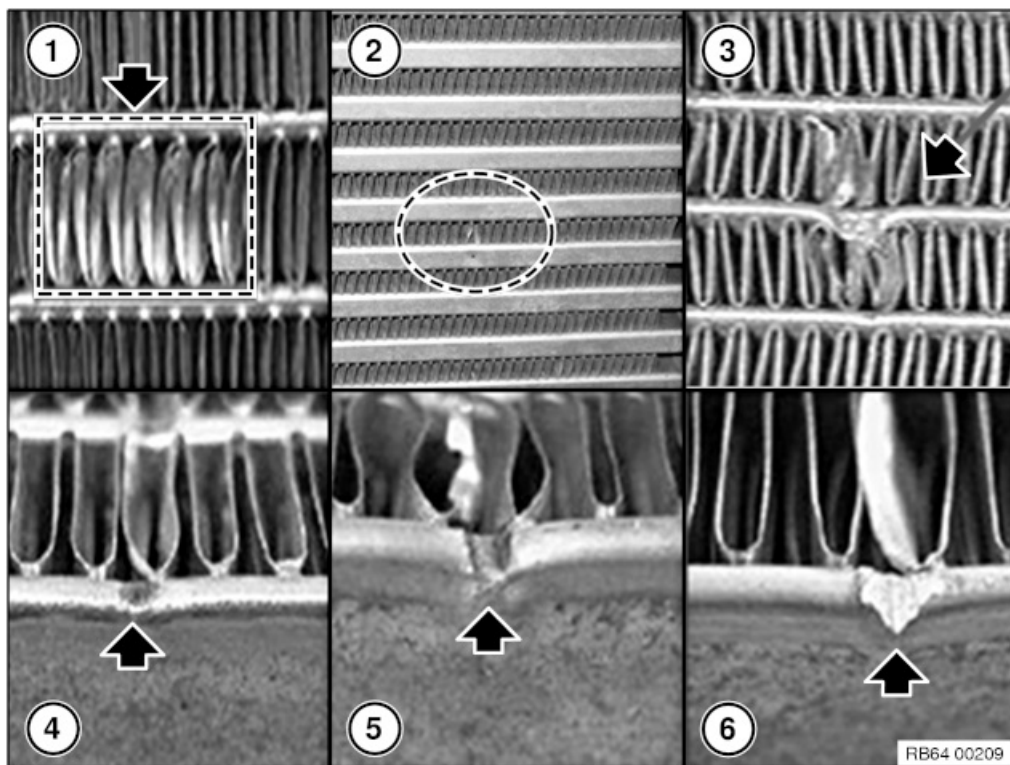
As long as tightness/function are not degraded and an adequate distance of a few mm between the radiator and air conditioning condenser remains in place, **this is not damage in either case.**

Radiators or air conditioning condensers are not to be replaced in these cases!

Note:

The deformations shown in Fig. (1) can be bent back with a standard fin comb..

Damage to lines carrying media or on the flat pipe require exchange of the radiator or air conditioning condenser (2-6).



Dryer flask (integrated in the air conditioning condenser):

Round dents/depressions are permitted.

The air conditioning condenser is not to be replaced in this case.



64 53 551 Removing and installing or replacing condenser for heating and air conditioning system



Special tools required:

- 00 9 030



Warning!

Avoid contact with refrigerant and refrigerant oil.

Observe the Safety Information for dealing with coolant.

Follow safety instructions for handling refrigerant oil.



Attention!

Risk of damage!

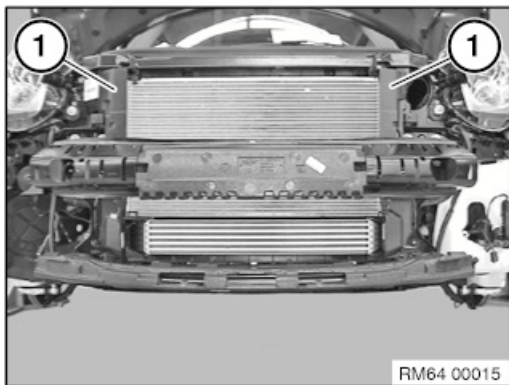
Restart engine only when air conditioning has been correctly filled.

If air conditioning is opened for more than 24 hours: Replace desiccant insert for heating and air conditioning system



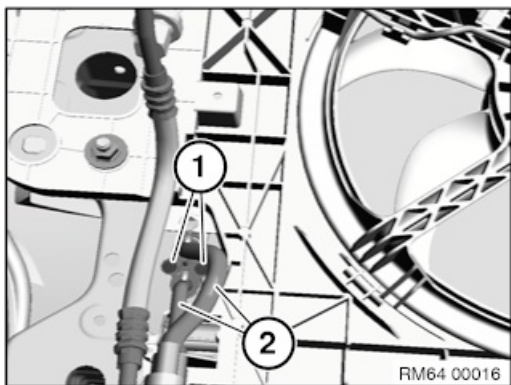
Necessary preliminary work:

- Drawing off, evacuating and filling the A/C system are not included in the time value given for this work operation
- Remove front bumper panel.



Remove air ducts (1) on the left and right.





Release screws (1).

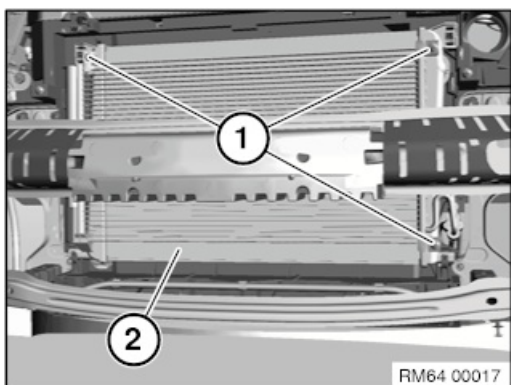
Tightening torque 64 53 01AZ.

Remove refrigerant lines (2) from condenser.

Installation note:

Renew sealing rings.

Use special tool 00 9 030 to install sealing rings without damaging them.



Release screws (1).

Lift out condenser (2).



After installation:

- Evacuate and fill air conditioning



**Warning!**

Danger of injury!

Refrigerant circuit is under high pressure!

Follow safety informations for handling R 134a refrigerant.

Follow safety instructions for handling refrigerant oil.

Avoid contact with refrigerant and refrigerant oil.

**Important!**

Risk of damage!

Restart engine only when air conditioning has been correctly filled.

Follow instructions for opening and replacing parts in refrigerant circuit.

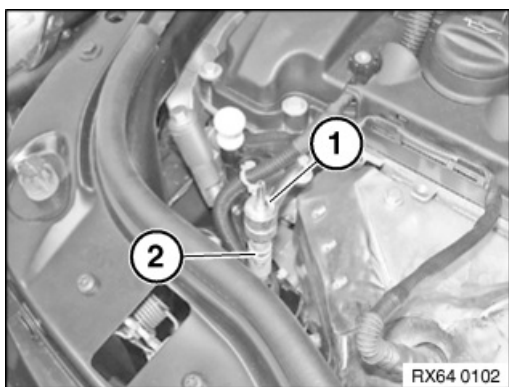
If air conditioning system is opened for more than 24 hours:
Replace desiccant insert for A/C system

**Note:**

The used special tool to be obtained from the BMW Workshop Equipment Catalogue is under the BMW order number: 81 34 0 427 679.

**Necessary preliminary tasks:**

- Drawing off, evacuating and filling the A/C system are not included in the time value given for this work operation



Unscrew the valve insert out of the filler neck (2) with the extractor (1). *Installation note:*

Only hand-tighten the valve insert!





After installation:

- Evacuate and fill air conditioning
- Check leak-tightness of valve insert with soapy solution

In event of leakage:

- Evacuate the air conditioning
- Check sealing surfaces on line and valve insert for damage, replace line or valve insert if necessary



**Special tools required:**

- 00 9 030

**Warning!**

Danger of injury!

Refrigerant circuit is under high pressure!

Follow instructions for handling R 134a refrigerant.

Avoid contact with refrigerant and refrigerant oil.

Follow safety instructions for handling refrigerant oil.

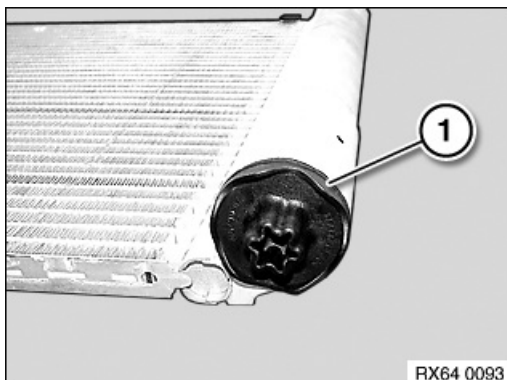
**Important!**

Risk of damage!

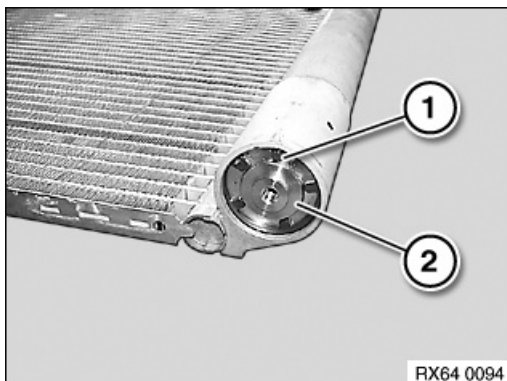
Restart engine only when A/C system has been correctly filled.

**Necessary preliminary tasks:**

- Drawing off, evacuating and filling the air conditioning system are not included in the time value given for this job item
- Remove condenser for air conditioning system



Remove protective cap (1).



Remove circlip (1) and pull out desiccant insert (2). *Installation note:*
Replace sealing rings.

Use special tool 00 9 030 to mount sealing rings without damaging them.





After installation:

- Evacuate and fill A/C system



**Warning!**

Avoid contact with refrigerant and refrigerant oil.
Follow safety informations for handling R 134a refrigerant.
Follow safety instructions for handling refrigerant oil.

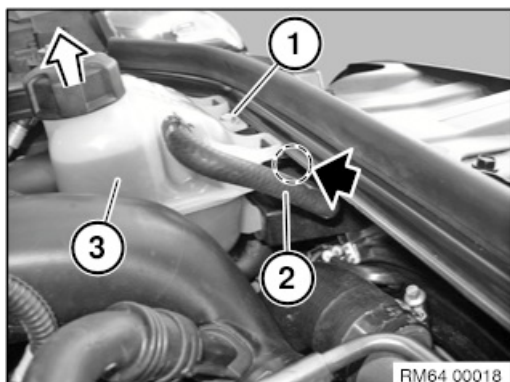
**Important!**

Risk of damage!
Restart engine only when A/C system has been correctly filled.

If air conditioning system is opened for more than 24 hours:
Replace desiccant insert for A/C system

*Necessary preliminary tasks:*

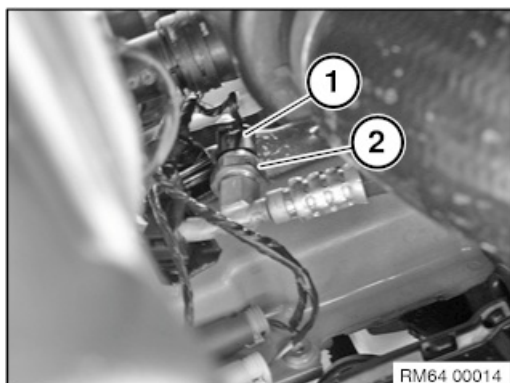
- Drain off air conditioning system



Release screw (1).

Remove expansion tank (3) toward top.

Unclip coolant hose (2) in marked area.

*Note:*

View from below for better presentation of the safety pressure switch (2).

Unfasten plug connection (1) and disconnect.

Unscrew safety pressure switch (2).

Tightening torque 64 53 4AZ.

**After installation:**

- Evacuate and fill air conditioning system



64 00 ... Information on using cleaning agent/paints (personal protection equipment)



Warning!

Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!

Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!



Important!

Observe following instructions:

- Store cleaning agents/paints only in a secure cabinet.
- Keep cleaning agents/paints away from naked flames and other sources of ignition.
- Protect cleaning agents/paints from high temperatures and direct sunlight.
- Always keep an eye douche on hand, change the water regularly (once a month).



Important!

Observe following instructions before use:

- Manufacturer's instructions (on container/packaging)
- Hazard warnings (on container/packaging)
- Manufacturer's instructions on package insert
- Material safety data sheet of manufacturer
- Product information in EPC
- National market regulations



Important!

Observe following instructions during use:

- Do not eat, drink or smoke while working with these products.
- Avoid direct contact with skin and eyes.
- Wear personal protective clothing/equipment.
- Ensure that all enclosed areas are well ventilated or extract fumes directly.
- Immediately change working clothes soiled with cleaning agent/paint.
- After finishing work, wash your hands and apply protective skin cream.



Important!

Follow hazard warnings and wear personal protection equipment!





First Aid:

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapours ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.



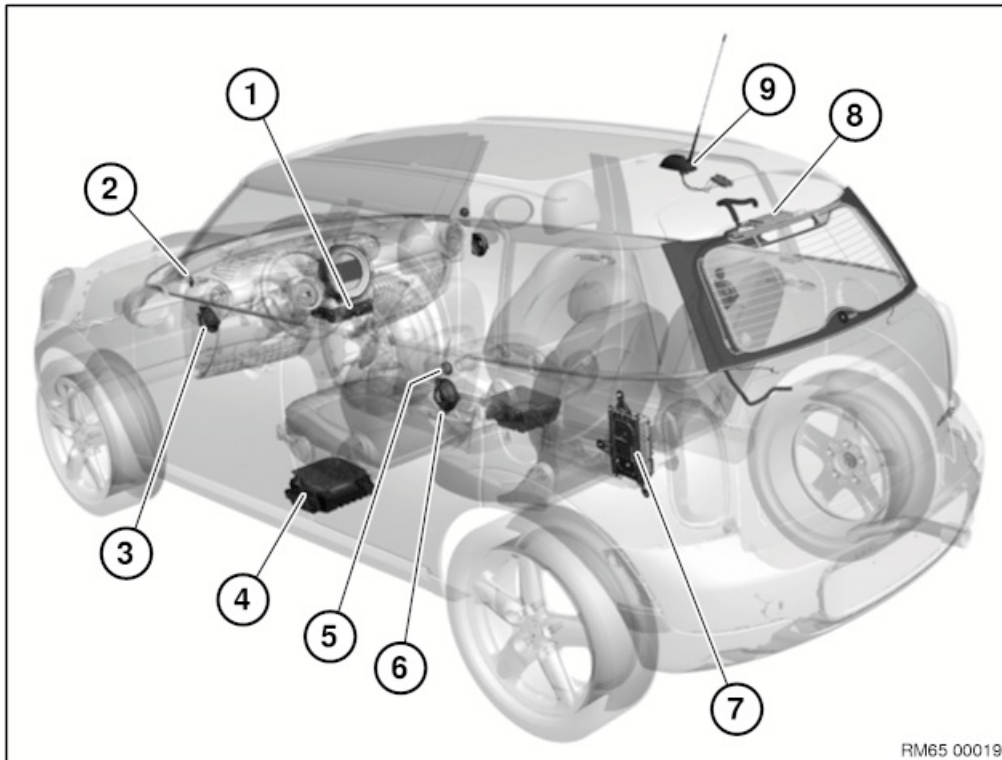
Recycling:

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.



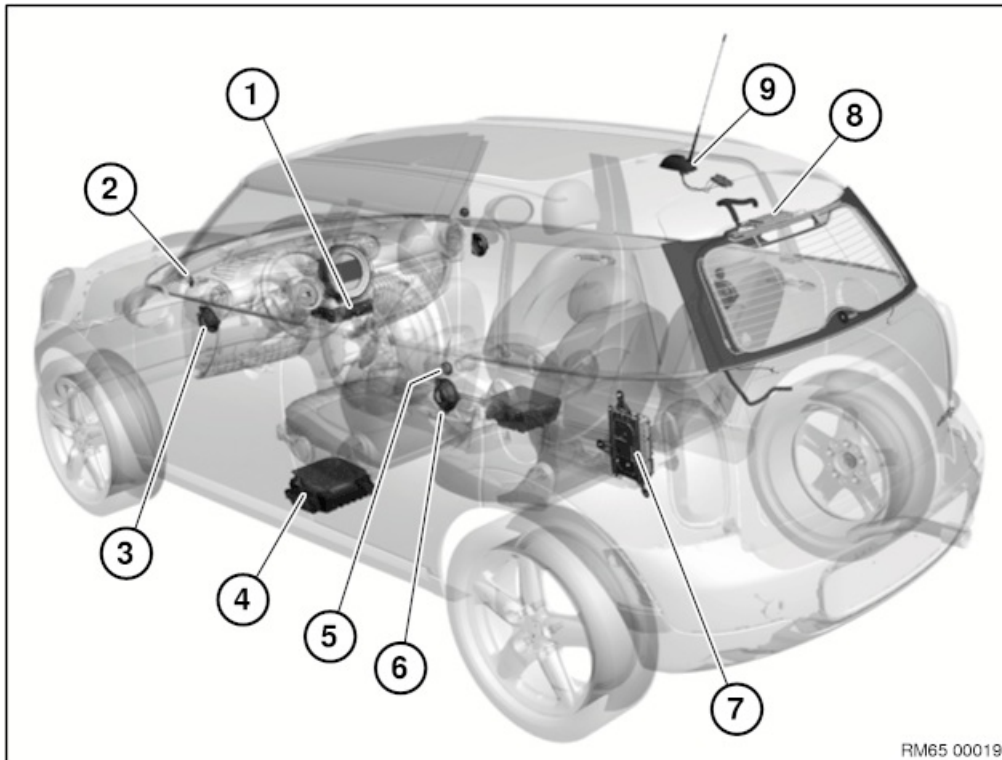
65 10 ... Overview of audio components



- | | |
|--|--------------------|
| 1 CHAMP / Radio | 7 Amplifier |
| 2 Tweeter in mirror triangle | 8 Aerial amplifier |
| 3 Mid-range speaker in front door | 9 Roof aerial |
| 4 Central bass speaker | |
| 5 Tweeter, rear door / side trim panel | |
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65 10 ... Overview of audio components



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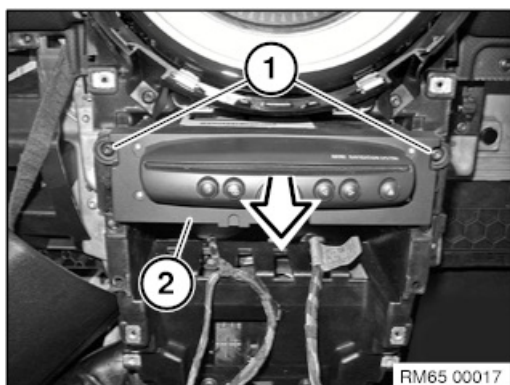


**Important!**

Read and comply with notes on protection against electrostatic discharge (ESD protection).

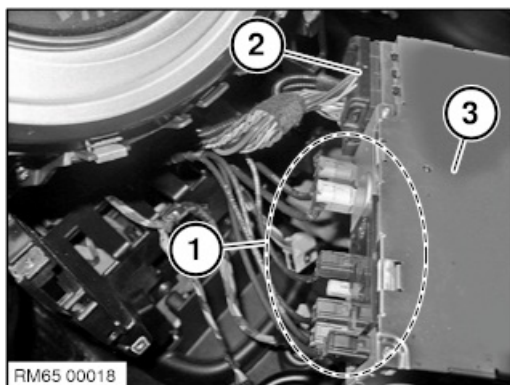
**Necessary preliminary tasks:**

- Disconnect battery negative cable
- Remove centre console cover



Release screws (1).

Pull out the CHAMP (2) to the front.



Unlock plug connections (1) and (2) and disconnect.

Remove CHAMP (3).

**Replacement:**

Carry out vehicle programming/encoding.

For vehicles with Teleservices optional equipment:

- Update services via menu in the central information display.

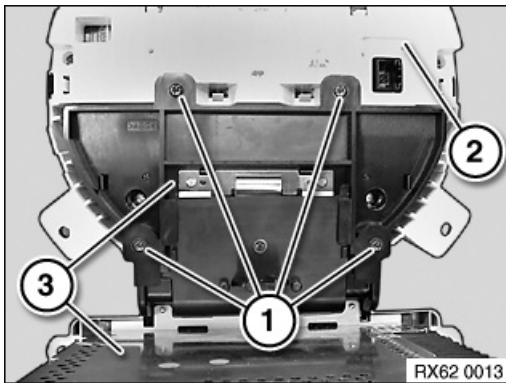


**Important!**

Read and comply with notes on protection against electrostatic discharge (ESD protection).

**Necessary preliminary tasks:**

- Disconnect negative battery cable
- Remove complete instrument panel

**Replacement:**

Release screws (1).

Remove speedometer (2) from radio (3).

**Replacement:**

Carry out vehicle programming/encoding



65 12 ... Install the correct navigation map (after replacing the head unit as from 07/2015)

Install the correct navigation map depending on the validity of the customer subscription after having replaced the head unit for vehicles with a production date as from 07/2015.

Different cases:

Customer subscription is **still valid**:

- Install the most recent navigation map.

Customer subscription has **expired**:

- Check when the customer subscription expired*.
- Install the navigation map applicable on the expiry date.

The customer subscription has **expired**. **After the expiry** of his/her subscription, the customer **purchased a newer version of the navigation map** ("One Time Update"):

- Check which navigation map was installed most recently*.
- Install this navigation map

* The information required to determine the term of the customer subscription is available in the following path:

After-sales Information Research (AIR)

- Navigation map

The following table is displayed in the "Navigation map" menu:

Installed map (Status with date)	Enabling code (Subscription)	Free update	Update subject to a charge
In this field the currently installed map with year specification is displayed. (E.g. navigation map Europe 2015)	Displayed in this field is: <ul style="list-style-type: none">• Validity of the subscription (E.g. valid until 31.10.2017)• or an enabling code for "One Time Update"	Displayed in this field is: <ul style="list-style-type: none">• During a valid subscription of the current, free enabling code• The last functional, free enabling code is shown if the subscription or "One time update" has expired	Displayed in this field is: <ul style="list-style-type: none">• The field is empty during a valid subscription• The next available, most recent enabling code subject to a charge if the subscription or "one time update" has expired

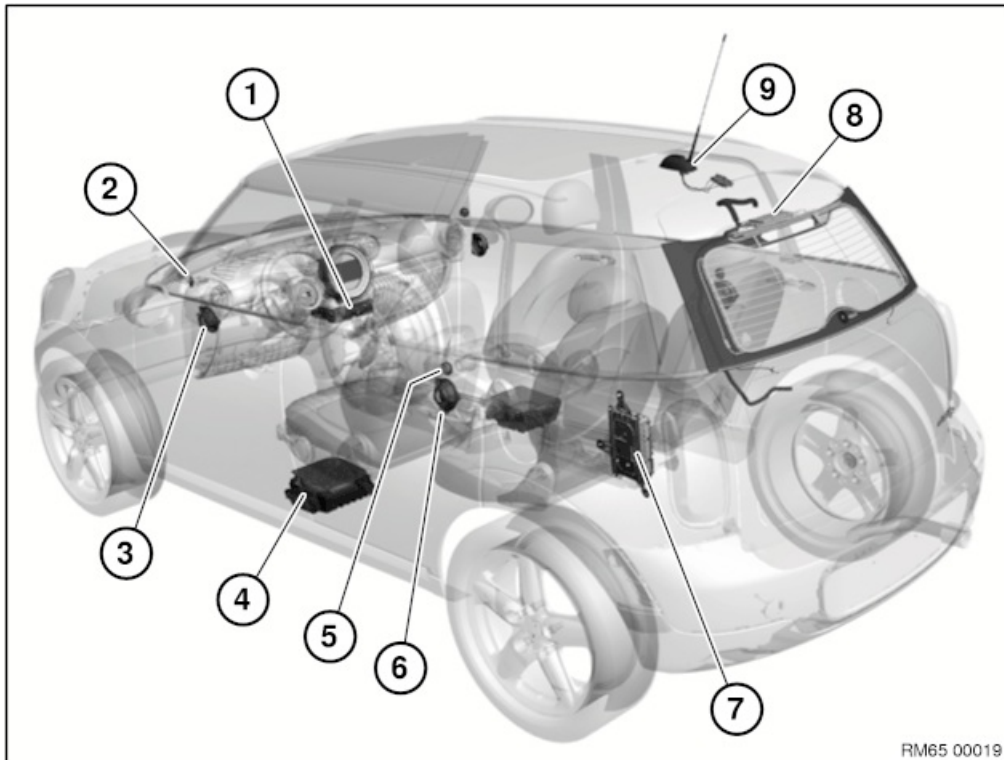
Go to the following path for more information on navigation, such as update variants, new features and compatibility tables:

After-sales Assistance Portal (ASAP)

- Product information bulletin
- 07 Infotainment and communication
- 03 Navigation update



65 10 ... Overview of audio components



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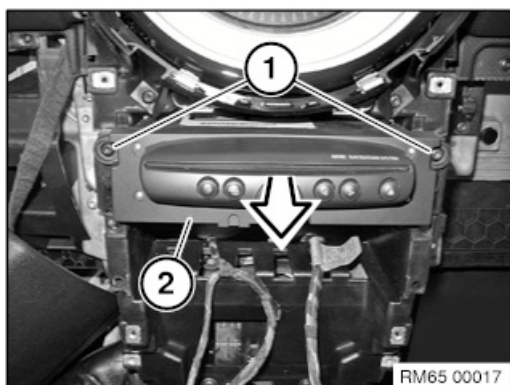


**Important!**

Read and comply with notes on protection against electrostatic discharge (ESD protection).

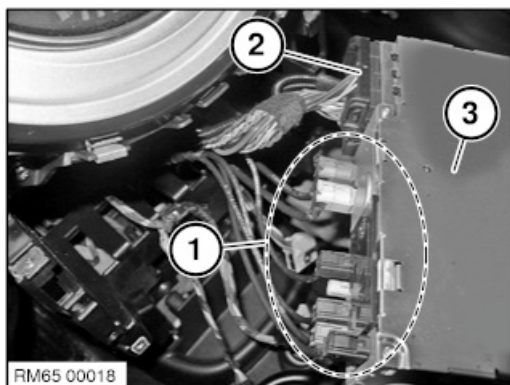
**Necessary preliminary tasks:**

- Disconnect battery negative cable
- Remove centre console cover



Release screws (1).

Pull out the CHAMP (2) to the front.



Unlock plug connections (1) and (2) and disconnect.

Remove CHAMP (3).

**Replacement:**

Carry out vehicle programming/encoding.

For vehicles with Teleservices optional equipment:

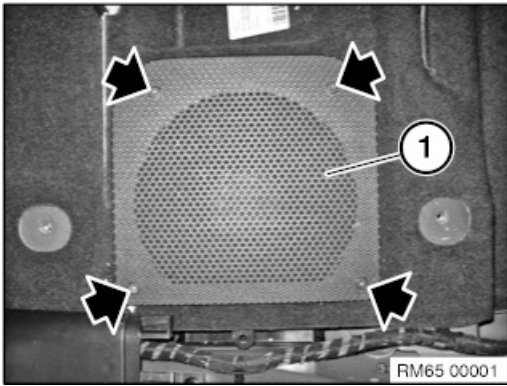
- Update services via menu in the central information display.





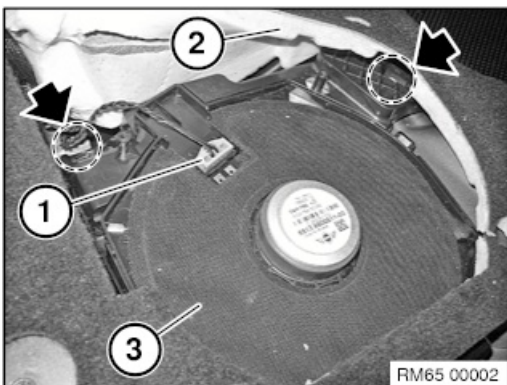
Necessary preliminary work:

- Remove left or right front seat.
- Remove entrance cover strip on rear left or right.



Release screws.

Remove cover (1) upwards.



Fold up the carpet (2) as shown.

Release nuts at marked points.

Unfasten plug connection (1) and disconnect.

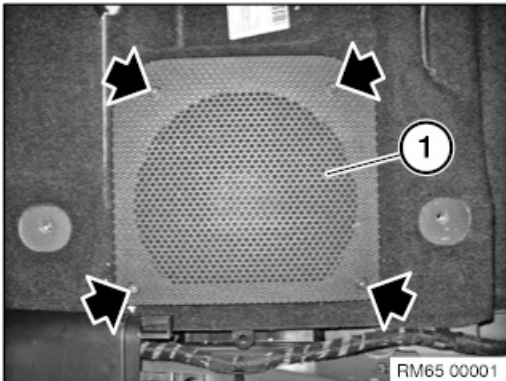
Feed out central bass speaker (3) upwards.





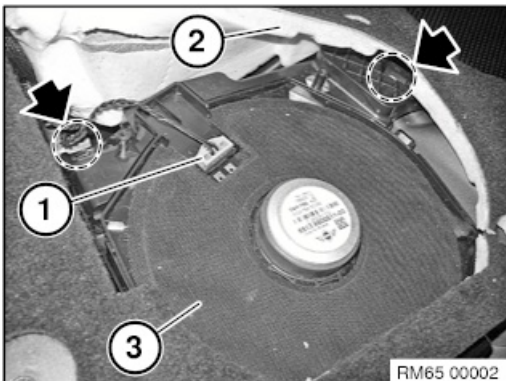
Necessary preliminary work:

- Remove left or right front seat
- Remove entrance cover strip on rear left or right.
- Remove combox holder or USB hub holder if necessary



Release screws.

Remove cover (1) upwards.



Release nuts at marked points.

Fold up the carpet (2) as shown.

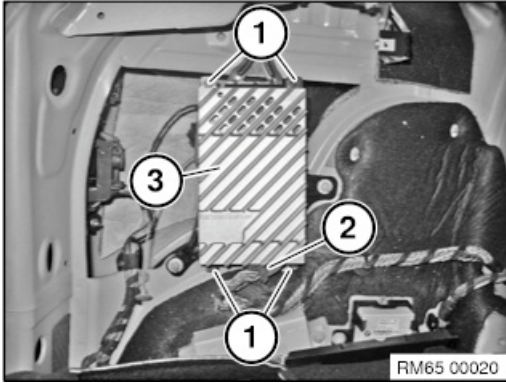
Unfasten plug connection (1) and disconnect.

Feed out central bass speaker (3) upwards.



*Necessary preliminary work:*

- Clamp off negative battery cable
- Remove left luggage compartment wheel arch trim



Unscrew nuts (1).

Unfasten plug connection (2) and disconnect.

Remove amplifier (3).

**Replacement:**

Carry out vehicle programming/encoding



65 12 220 Removing and installing/replacing satellite tuner (only for US models starting at 08/2010)



Necessary preliminary work:

- Remove radio receiver



When replacing, please observe:

Record SID number (1) of the removed device.

Note:

The SID number (1) can be found on the label of the housing. Location may be different, depending on the equipment manufacturer.

Record SID number (1) of the new device.

Input enabling code from the Aftersales Assistance Portal, ASAP.



Replacement:

Perform vehicle programming/encoding.

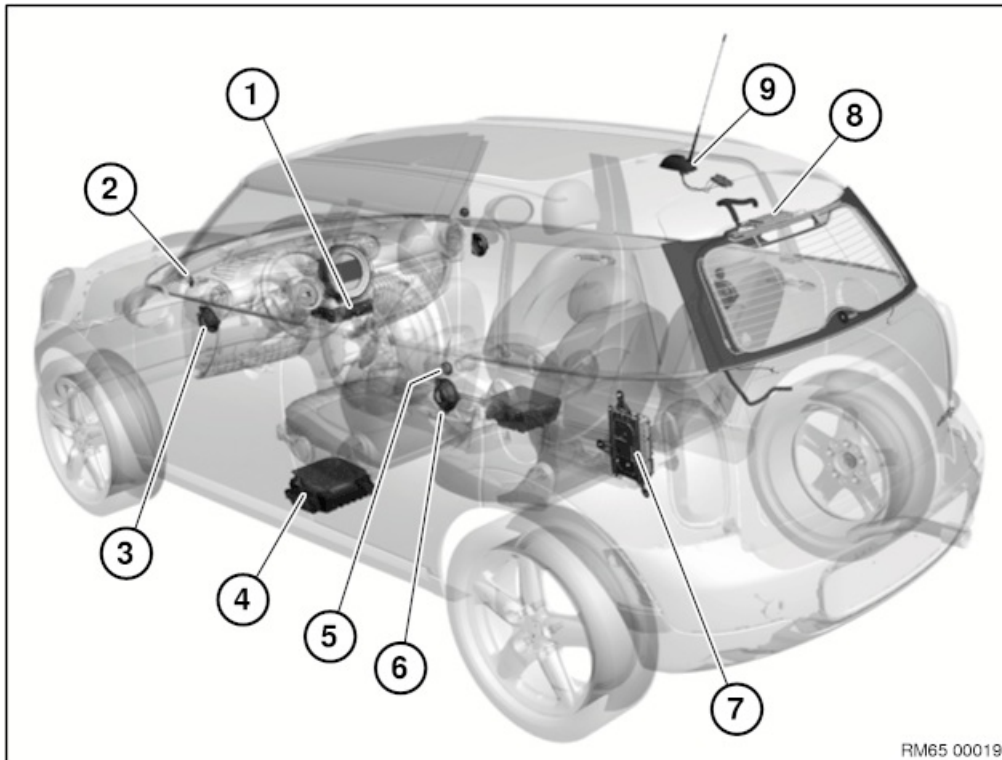


Note:

Please contact Sirius. Use the SID number to cancel current device and register new one.



65 10 ... Overview of audio components



- | | |
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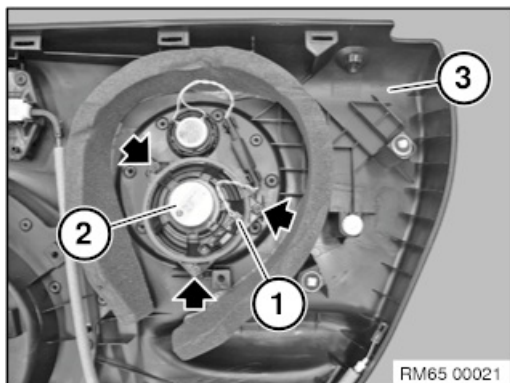


65 13 090 Removing and installing / replacing speaker (mid-range speaker, rear door, left or right)



Necessary preliminary work:

- Remove rear door trim panel



Disconnect plug connection (1).

Release nuts at marked points.

Remove speaker (2) from door trim panel (3).

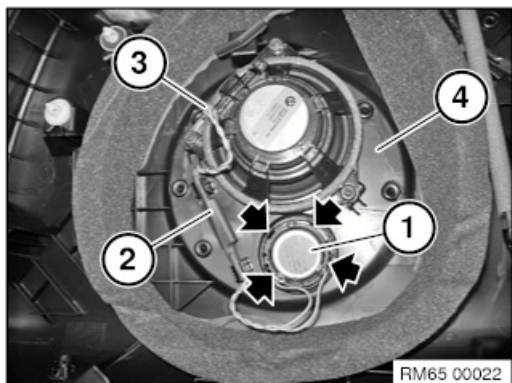


65 13 080 Removing and installing / replacing speaker (tweeter, rear door, left or right)



Necessary preliminary work:

- Remove rear door trim panel



Disconnect plug connection (3).

Unclip resistor (2).

Release nuts at marked points.

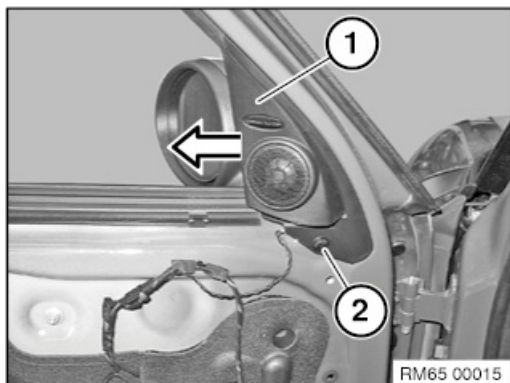
Remove speaker (1) from door trim panel (4).





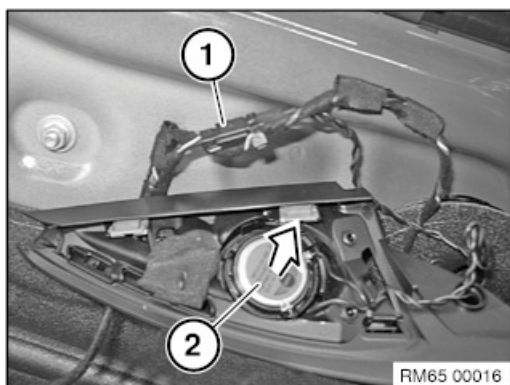
Necessary preliminary tasks:

- Remove front door trim panel



Lift out expanding rivet (2).

Remove tweeter cover (2) in direction of arrow.



Release cable strap and disconnect plug connection (1).

Remove tweeter (2) in direction of arrow.

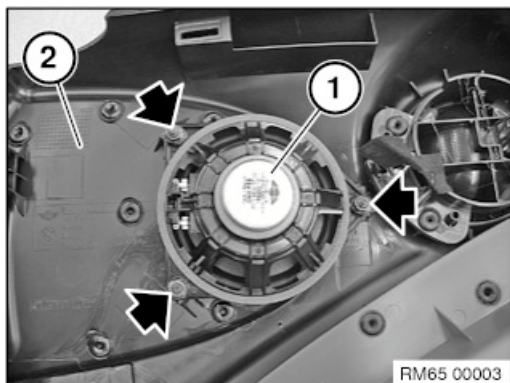


65 13 070 Removing and installing/replacing speakers (mid-range speaker, front door left and right)



Necessary preliminary tasks:

- Remove front door trim panel

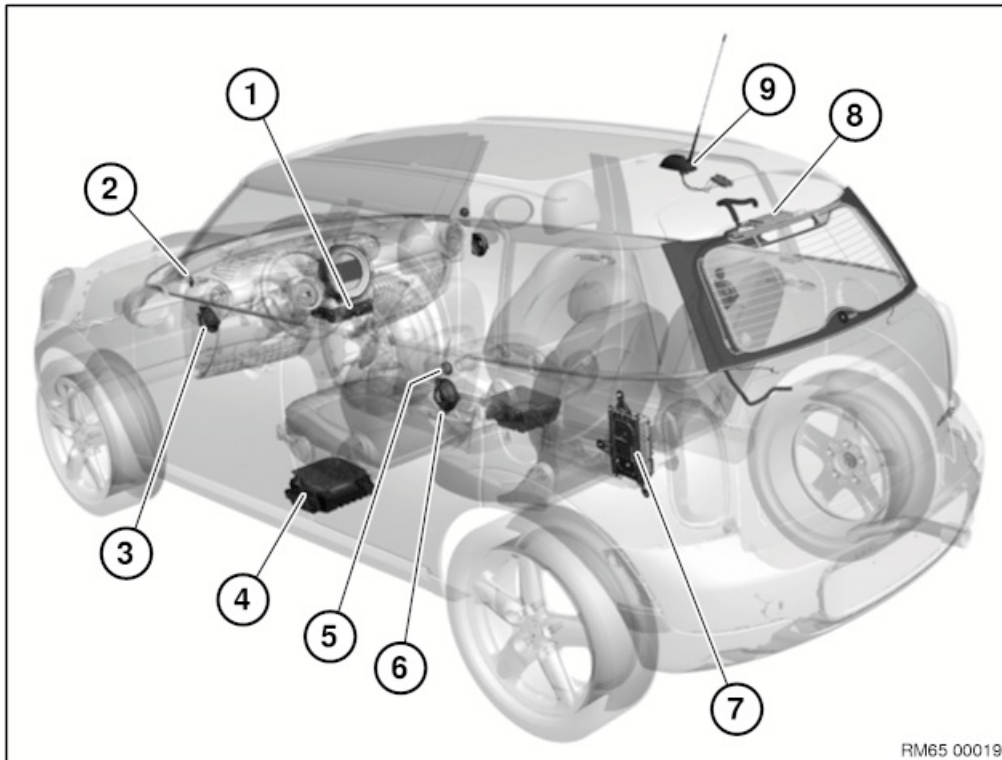


Release screws.

Remove speaker (1) from door trim panel (2).



65 10 ... Overview of audio components

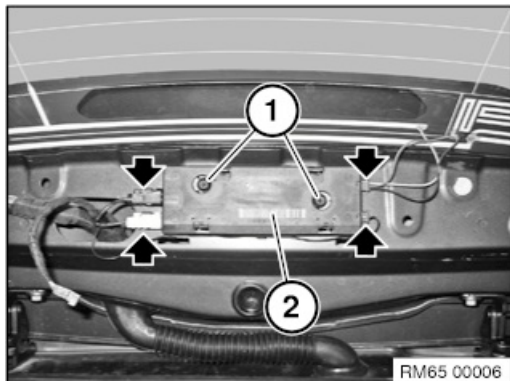


- | | |
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**Necessary preliminary work:**

- Remove trim panel for rear window frame at top



If necessary, unlock plug connections and disconnect.
Release screws (1) and remove aerial amplifier (2).





The following work is identical to:

- Removing and installing/renewing roof-mounted aerial on version with slide/tilt sunroof

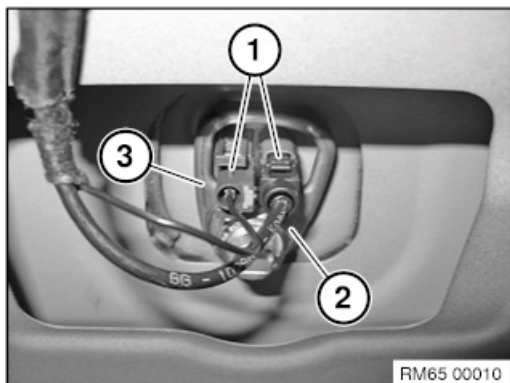


65 20 022 Removing and installing/renewing roof-mounted aerial (on version with slide/tilt sunroof)



Necessary preliminary tasks:

- Lower the headlining (do not remove completely)

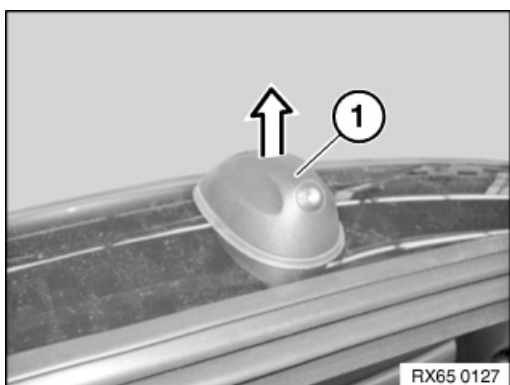


Unlock plug connections (1) and disconnect.

Slacken nut (2).

Tightening torque 65 20 2AZ.

Remove holder of base of aerial (3) downwards.

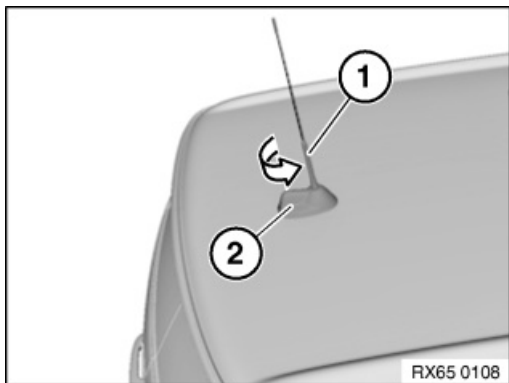


Remove roof aerial (1) in upward direction in direction of arrow.



65 20 010

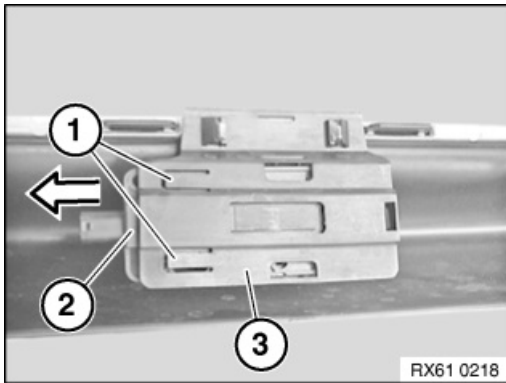
Removing and installing/replacing antenna rod of roof antenna



Unscrew antenna rod (1) in counterclockwise direction from antenna base (2) and remove.



61 35 975 Removing and installing/replacing bumper aerial for comfort access system



On R55, R60:

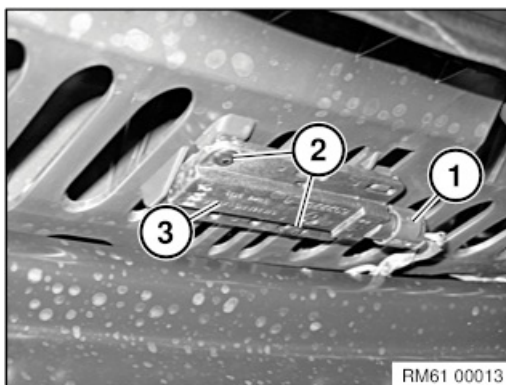
Note:

Shown with bumper panel removed for purposes of clarity.

Disconnect associated plug connection.

Unlock latch mechanisms (1).

Feed the bumper aerial for the comfort access system (2) out of the holder (3) in the direction of the arrow.



On R61:

Note:

Shown with bumper panel removed for purposes of clarity.

Unfasten plug connection (1) and disconnect.

Release expanding rivet (2).

Remove the bumper aerial for the comfort access system (3) from the support.

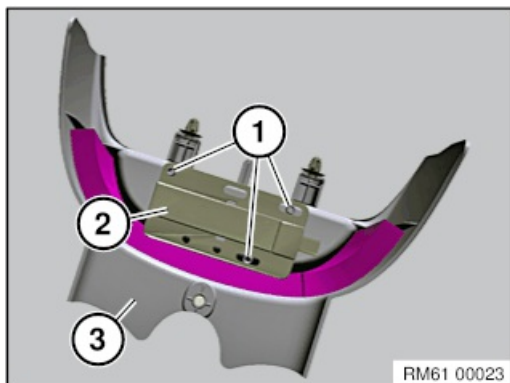


61 35 953 Removing and installing/replacing interior aerial for Comfort Access System (storage compartment, front)



Necessary preliminary tasks:

- Remove storage compartment



Release screws (1).

Remove the interior aerial for the comfort access system (2) from the storage compartment (3).

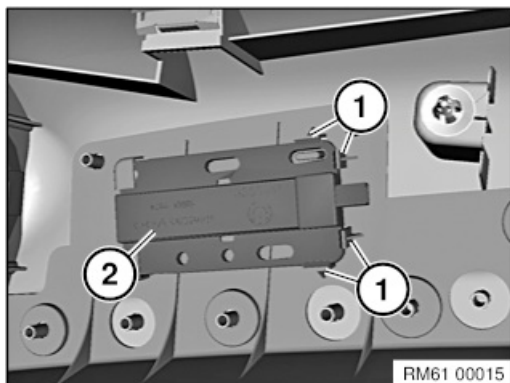


61 35 958 Removing and installing/replacing interior antenna for Comfort Access System on left or right (front door) (after vehicle diagnosis)



Necessary preliminary tasks:

- Remove front door trim panel



Unlock latch mechanisms (1) and take interior aerial (2) out of bracket. *Installation note:*

Make sure interior aerial (2) is correctly engaged in bracket.

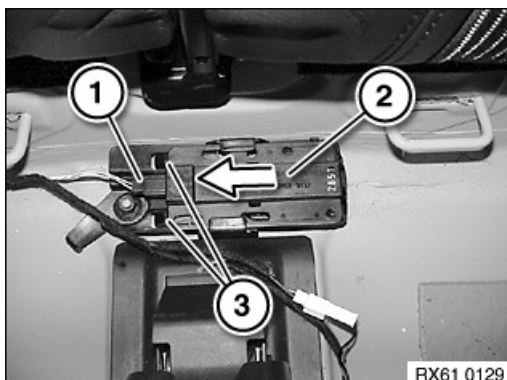


61 35 954 Removing and installing/ replacing interior aerial for comfort access system (rear seat)



Necessary preliminary tasks:

- Remove rear seat (not R60)
- Remove the trim cover from the rear of the floor trim (only R60)

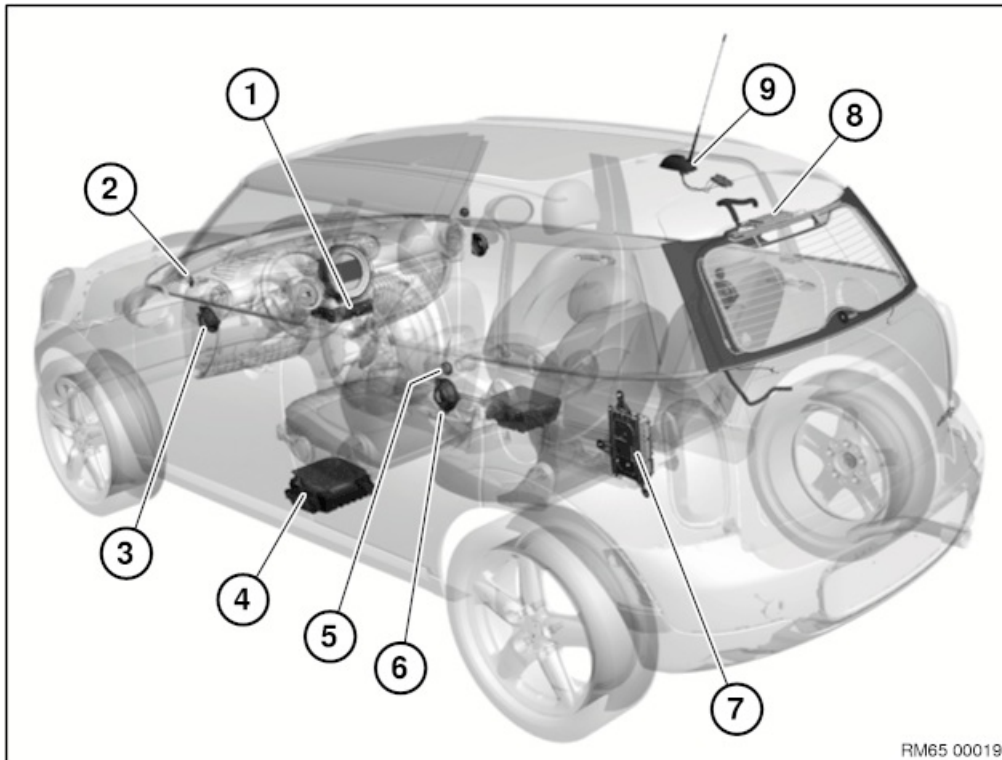


Disconnect plug connection (1).

Unlock catches (3) and remove interior antenna for comfort access system (2) in direction of arrow from holder.



65 10 ... Overview of audio components

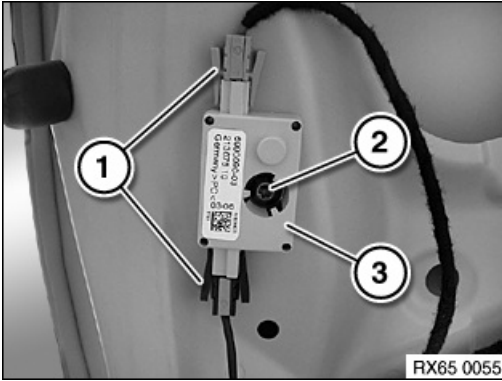


- | | |
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**Necessary preliminary work:**

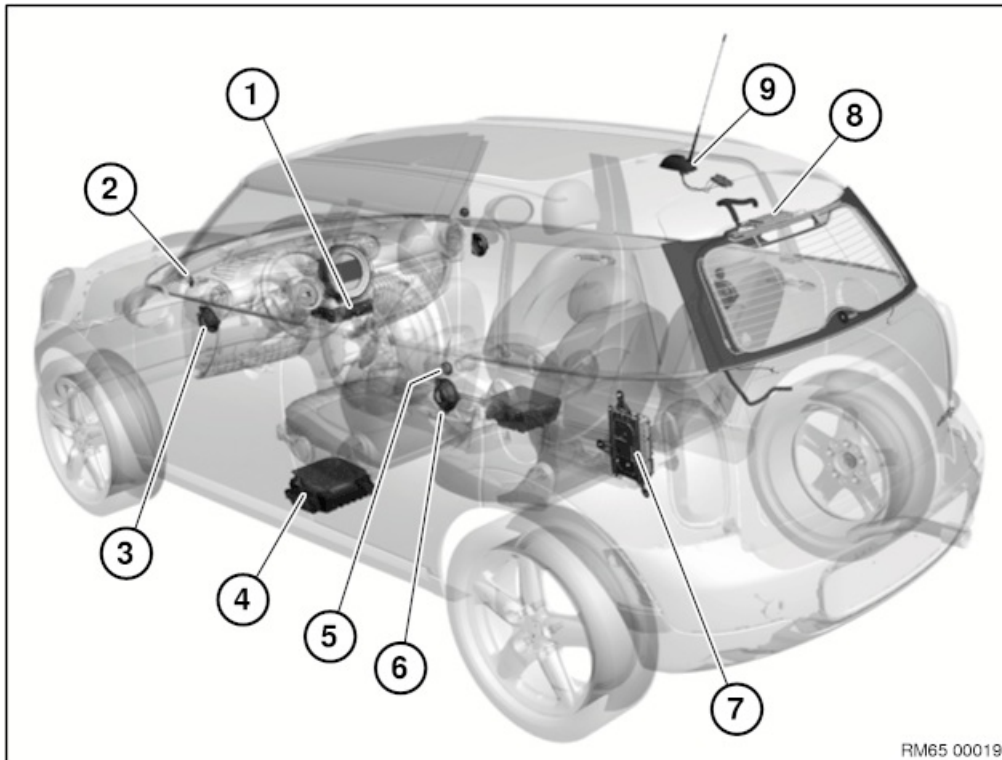
- Remove trim for rear lid at bottom



Disconnect plug connections (1) and release screw (2).
Remove wave trap (3).



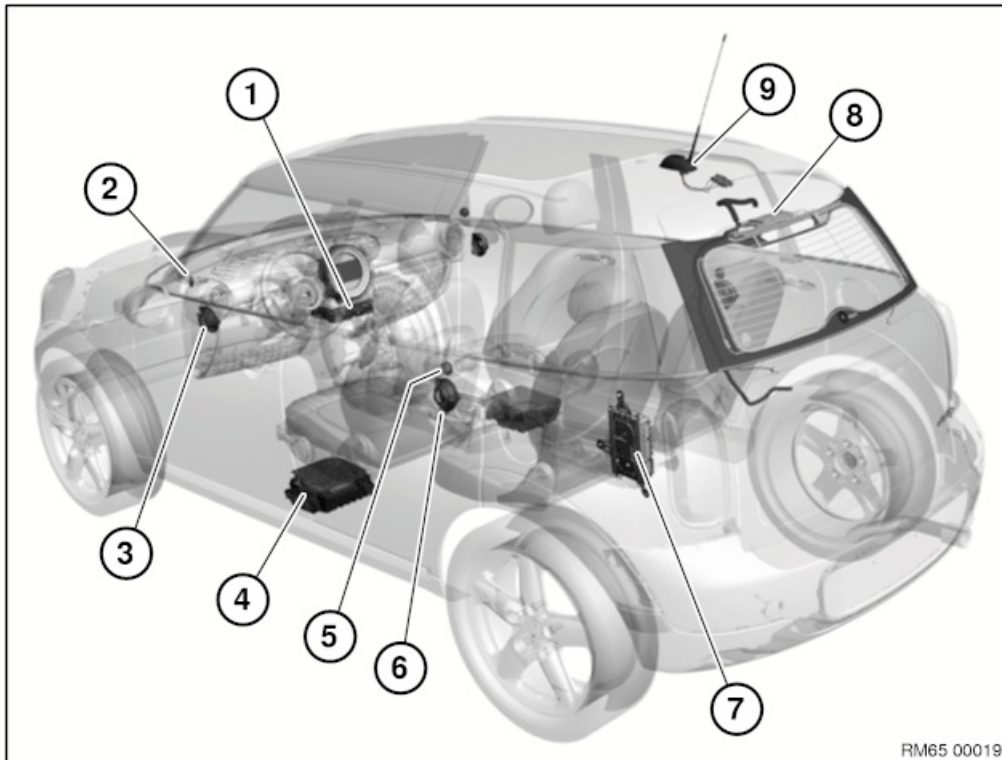
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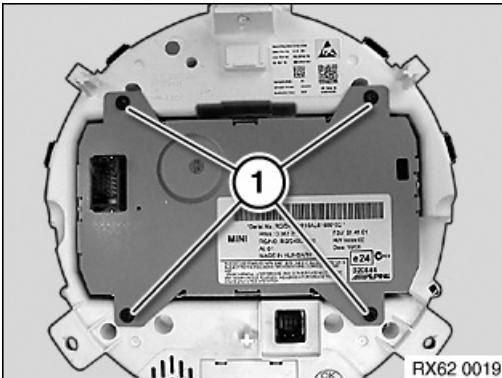


**Important!**

Read and comply with notes on protection against electrostatic discharge (ESD protection).

**Necessary preliminary tasks:**

- Remove complete navigation instrument cluster



Release screws (1).

Remove navigation display from instrument cluster.



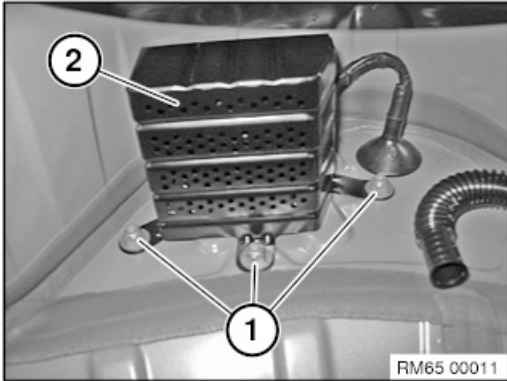
Carry out vehicle programming/encoding.





Necessary preliminary tasks:

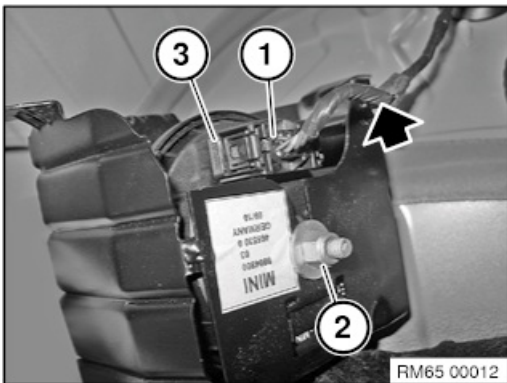
- Remove rear right wheel arch cover



Unscrew nuts (1).

Tightening torque 65 75 3AZ.

Remove holder (2) with emergency power siren.



Unfasten plug connection (1) and disconnect.

Release cable fixation.

Remove the holder (3) with emergency power siren.

Replacement:

Slacken nut (2).

Remove emergency power siren (3) from holder.

Tightening torque 65 75 2AZ.

Installation note:

Make sure tilt alarm sensor is correctly seated in holder (2).



Replacement:

Carry out vehicle programming/encoding.





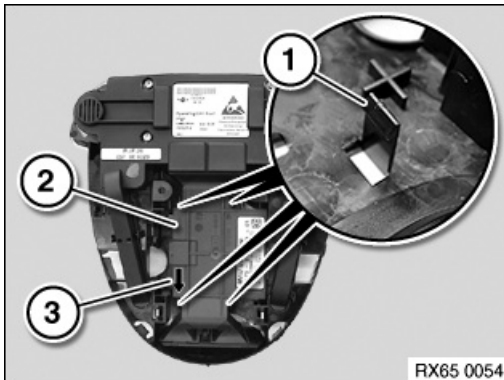
Important!

Read and comply with notes on protection against electrostatic discharge (ESD protection).



Necessary preliminary tasks:

- Remove roof operating facility



Carefully unclip catches (1) and remove ultrasonic module (2). *Installation note:*

Latch mechanisms (1) must not be damaged.

Direction arrow (3) must point in opposite direction to direction of travel.



Carry out programming/encoding.



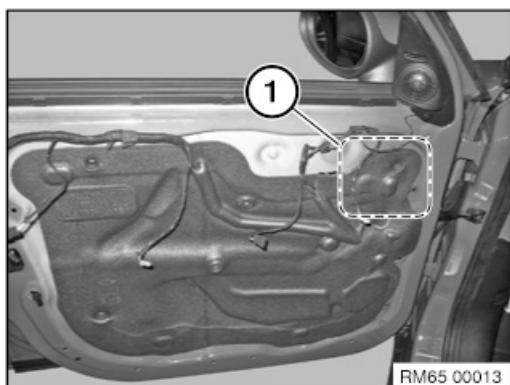
**Warning!**

Note airbag safety regulations!

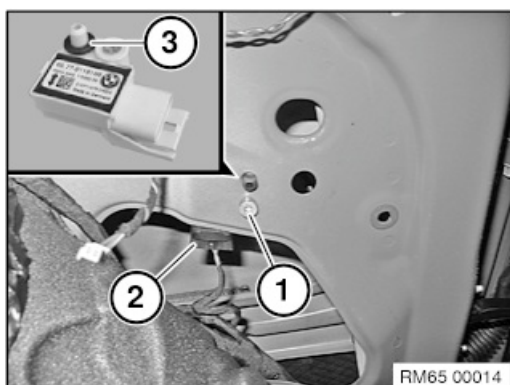
Incorrect handling can lead to airbag deployment and cause injury!

**Necessary preliminary tasks:**

- Remove front left door trim panel



Open sound insulation in area (1).



Release screw (1).

Tightening torque 65 77 2AZ.

Feed out sensor and disconnect plug connection (2).

Installation note:

Make sure sensor is securely seated in door panel.

Sealing ring (3) must not be missing!



**Warning!**

Comply with airbag safety regulations.

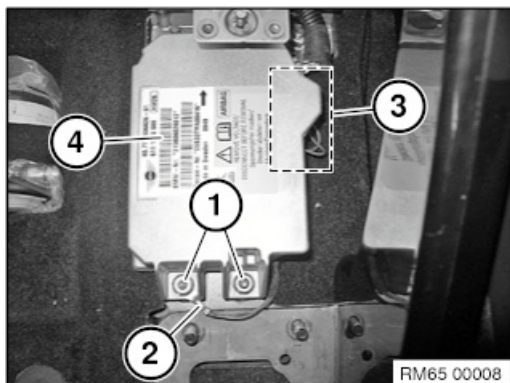
Incorrect handling can lead to airbag deployment and cause injury.

**Important!**

Read and comply with notes on protection against electrostatic damage (ESD protection).

**Necessary preliminary work:**

- Disconnect battery earth lead
- Remove complete centre console

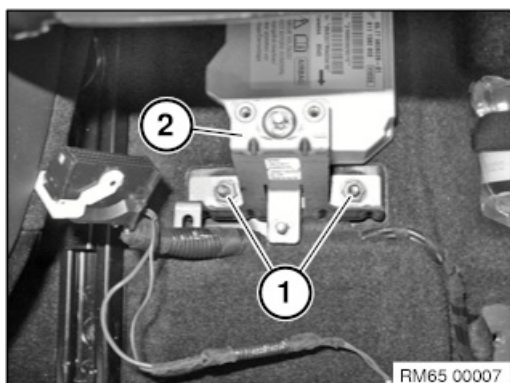


Unscrew nuts (1).

Tightening torque 65 77 1AZ.

Take off earthing cable (2).

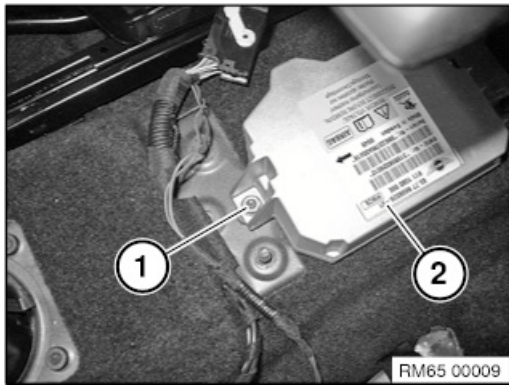
Unlock plug connection (3) at airbag control unit (4) and disconnect.



Unscrew nuts (1).

Take off holder (2).





Slacken nut (1).

Tightening torque 65 77 1AZ.

Remove airbag control unit (2).



Replacement:

Carry out vehicle programming and encoding

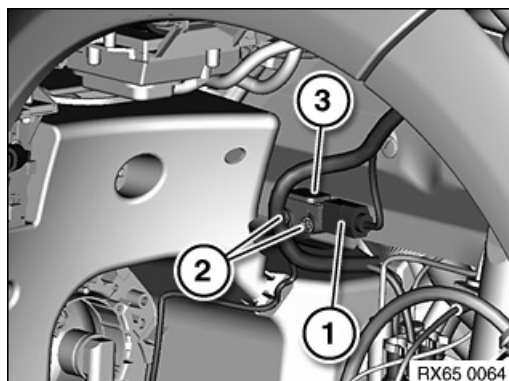


65 77 532 Removing and installing/replacing front left acceleration sensor (US version only)



Necessary preliminary work:

- Remove wheel arch cover at front



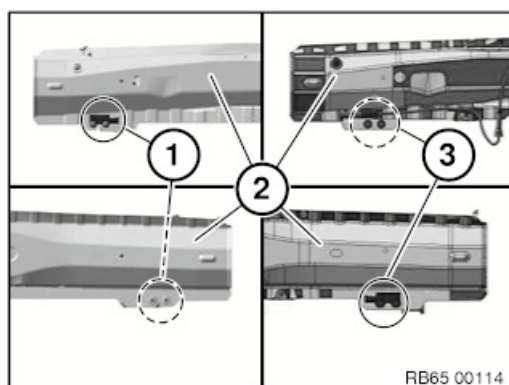
Disconnect plug connection (1).

Release screws (2) and remove acceleration sensor (3).

Installation note:

Replace screws (2).

Tightening torque 65 77 4AZ .



Note:

The installation position of the acceleration sensor has been changed on vehicles built after 08/2010:

(1) Installation position before 08/2010

(3) Installation position after 08/2010

The acceleration sensor (3) is positioned slightly offset on the other side of support (2).



65 77 534 Removing and installing/replacing front right acceleration sensor (US version only)



The following operation is identical to:

Removing front left acceleration sensor



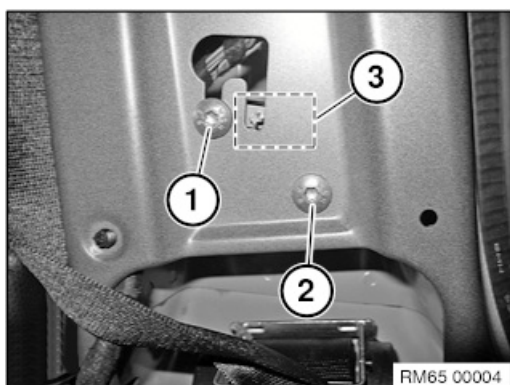
**Warning!**

Comply with airbag safety regulations.

Incorrect handling can lead to airbag deployment and cause injury.

**Necessary preliminary work:**

- Disconnect battery earth lead
- Remove trim panel for door post

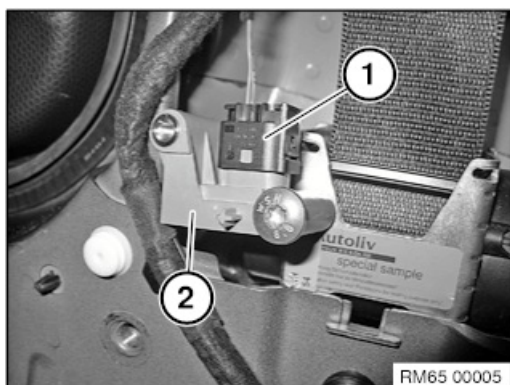


Slacken bolt (1).

Release screw (2).

Tightening torque 65 77 3AZ.

Feed out sensor (3).



Unfasten plug connection (1) and disconnect.

Remove sensor (2).



65 77 725

Removing and installing/replacing right B-pillar sensor



Operation is identical to:

Removing and installing left B-pillar sensor



65 77 745

Removing and installing/replacing right front door sensor



Operation is described in:

Removing and installing/replacing front left door sensor.



65 77 604 Replacing sensor mat (CIS mat) for front passenger seat occupancy detector



Warning!

Note airbag safety regulations!

Incorrect handling can activate airbag and cause injury.



Warning!

Only US and Canadian version of front passenger seat (with CIS mat):

The CIS mat is bonded to the entire surface of the facing and can only be removed in conjunction with the padding from the seat cover.

If CIS mat or padding is defective, both parts may only be replaced together.

Full functional capability can only be guaranteed with original BMW spare parts.

After installation, the CIS mat must be enabled with the BMW programming system.

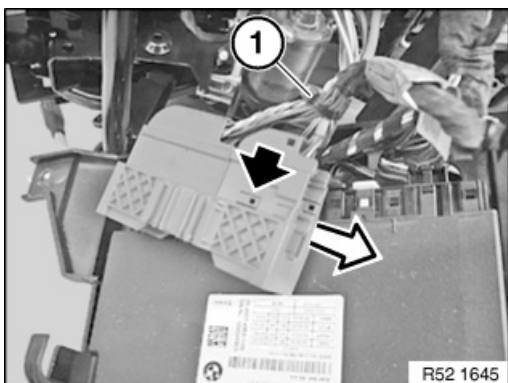


Procedure for replacing the CIS mat together with the upholstery is described in:

- Remove seat cover for front seat



The work scope with CIS mat is different for the following work steps:



Cut open cable strap (1).

Installation note:

Replace defective cable strap.

Raise tab and pull connector from connector housing.



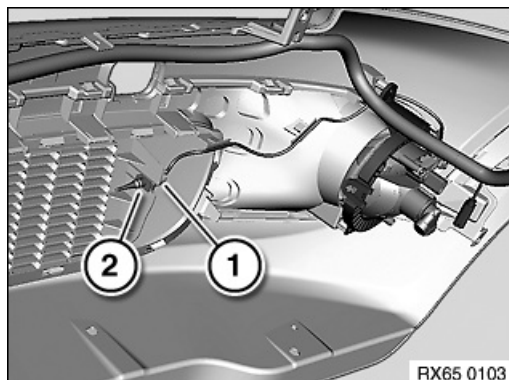
Enabling seat occupancy detector (CIS mat):

- Connect BMW programming system
- Code airbag control unit
- Delete fault memory if necessary



**Necessary preliminary work:**

- Remove middle front radiator grille

*Note:*

For purposes of clarity, graphic shows bumper removed.

Disconnect plug connection (1) and unclip outside temperature sensor (2).

Installation note:

Ensure correct cable routing.





The following applies in general:

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies:

Shielded lines

Interference radiation and interference resistance can lead to neutral zones at contact points in the shielding. Consequently, distinctions have to be drawn between the following types:

Coaxial lines

- Shielded coaxial cables RTK031 may only be repaired with special crimping tool.
- For aerial lines only the bushing contact may be repaired.
- RG174 Lines and the bushing contact may not be repaired.

CVBS lines

- CVBS cables may not be repaired.
- CVBS cables must be replaced in their entirety.

HSD lines

- HSD cables may not be repaired.
- HSD cables must be replaced in their entirety.

Optical fibre cable:

Note:

Fibre-optic cables are coloured differently as follows:

- Green = **MOST** (Media Oriented Systems Transport) optical fibres
- Yellow = **ISIS** (Intelligent Safety and Integration System) optical fibres
- Orange=repair fibre-optic cables

Attention!

- Fibre-optic cables are permitted to show only one junction point (bridge), replace fibre-optic cables if necessary
- Smallest permissible bending radius is 25 mm
- Avoid effects of heat $\geq 85^\circ$

Treating cables and optical fibres

FlexRay (twisted cables)

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

Note:

- FlexRay lines may only reveal one separation point (bridge) per line



- Flexray lines may only reveal one separation point (bridge); renew complete line if necessary.
- If possible, maintain twisted cable after repair.
- After repairs, twist cables as close as possible to the connector/separation point.
- Twisting must be as symmetrical as possible.

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables

Replacing wiring harnesses

Repair wiring harnesses mainly cover the full equipment of the vehicle. If certain optional equipment is not installed in the vehicle, note the following:

- If necessary, secure the remaining connectors.
- If necessary, seal the remaining connectors outside the vehicle interior, for example, with butyl tape in such a way that moisture ingress can be eliminated permanently.

Note:

Repair wiring harnesses can be equipped with an **additional socket housing** (e.g. 30-pin), **which was not provided on the previous vehicle-side wiring harness**. This socket housing also cannot be found in the wiring diagram.

Procedure

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **in the vehicle interior** (in the footwell, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.
- Alternatively, a suitable pin housing can be fitted on the vehicle-side wiring harness and connected to the additional socket housing.

However, this is permitted only if the following conditions are met:

- Carpets must not protrude visibly or become deformed due to the installation of the additional plug connection.
- It must be possible to install the adjacent components (for example, trims, trim panels, etc.) correctly after installing the additional plug connection.
- All the attachment points of the adjacent components (for example, trims, trim panels, etc.) must engage correctly.
- There must be no rattling noise due to the installation of the additional plug connection.
- The additional plug connection must not damage the adjacent components/wiring harnesses, etc..

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **outside the vehicle interior** (in the wheel arch, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.



- **Using the additional socket housing is not permitted with a separation point outside the vehicle interior.**



65 12 220 Removing and installing/replacing satellite tuner (only for US models starting at 08/2010)



Necessary preliminary work:

- Remove radio receiver



When replacing, please observe:

Record SID number (1) of the removed device.

Note:

The SID number (1) can be found on the label of the housing. Location may be different, depending on the equipment manufacturer.

Record SID number (1) of the new device.

Input enabling code from the Aftersales Assistance Portal, ASAP.



Replacement:

Perform vehicle programming/encoding.



Note:

Please contact Sirius. Use the SID number to cancel current device and register new one.





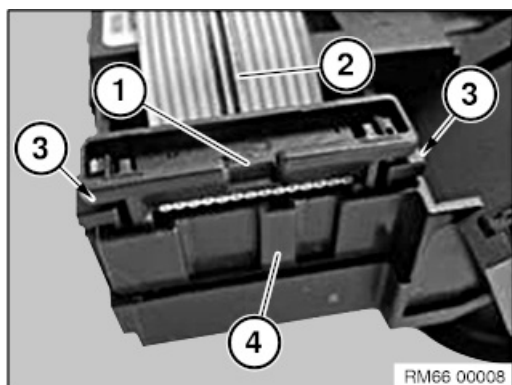
Special tools required:

- 00 9 340



Necessary preliminary work:

- Remove lower left trim from instrument panel



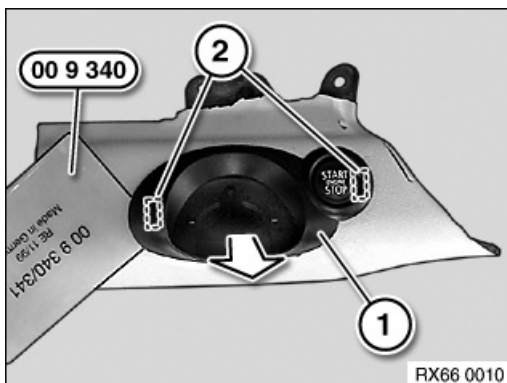
Important!

In the event of complaint "slide-in unit for radio-operated key jams or can not be retained", carry out following checks before replacement:

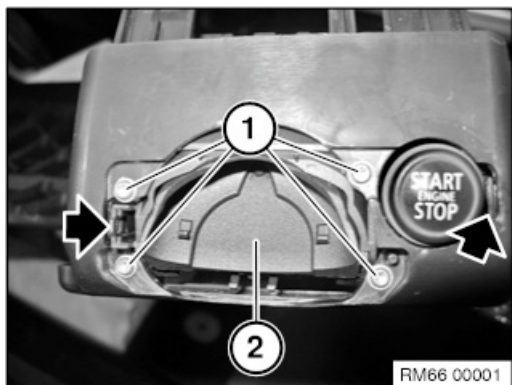
1. Check both sides of plug connection of ribbon cable (1) to slide-in unit for radio-operated key (4) for correct locking (3).
2. Check ribbon cable (2) for damage.

If required, lock plug connection of ribbon cable (1) correctly and carry out function check.

If this rectifies fault pattern, do not replace slide-in unit for radio-operated key.



Lever out cover (1) in direction of arrow using special tool 00 9 340 at retaining points (2).

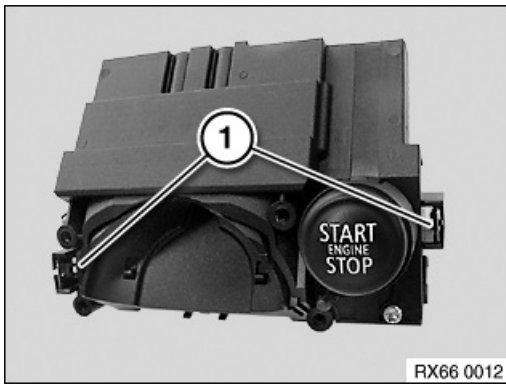


Release screws (1).

Release clips at marked points.

Remove slide-in unit for radio-operated key (2).

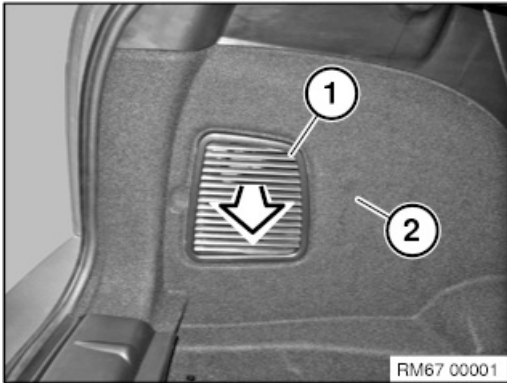




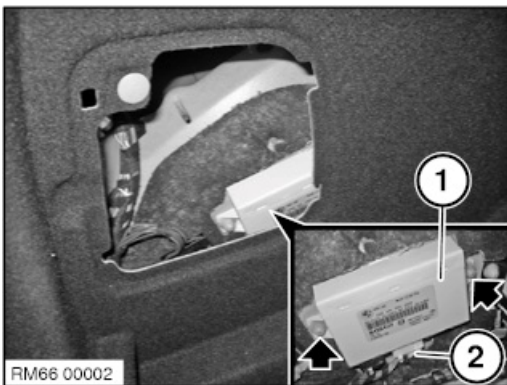
Installation note:

Make sure clasps (1) are correctly seated, replace if necessary.





Remove cover (1) in direction of arrow from luggage compartment side panelling (2).



Release plastic nuts and remove.

Feed out control unit (1).

Unfasten plug connection (2) and disconnect.

Remove control unit (1).



Replacement:

Carry out programming/encoding.



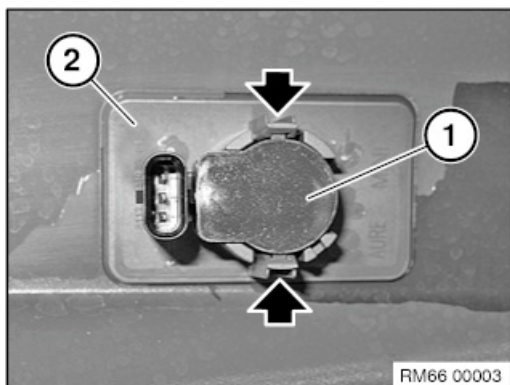
**Necessary preliminary work:**

On version with JCW Aerodynamic package:

- Remove rear bumper

**Note:**

The ultrasound converter (1) can be replaced without dismantling the bumper panel.



Unlock associated plug connection and disconnect

Spread latches and remove ultrasound converter (1) from bracket (2).

Installation note:

Before installation of ultrasonic sensor (1) on wiring harness, clean plug connection!

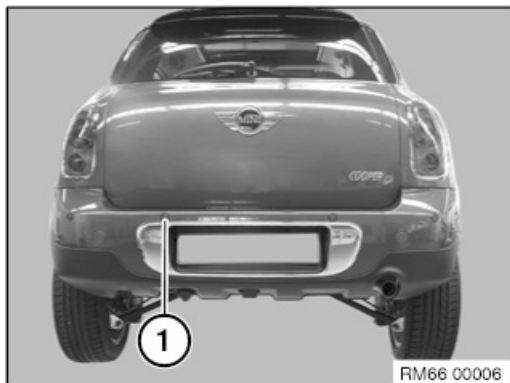




Necessary preliminary work:

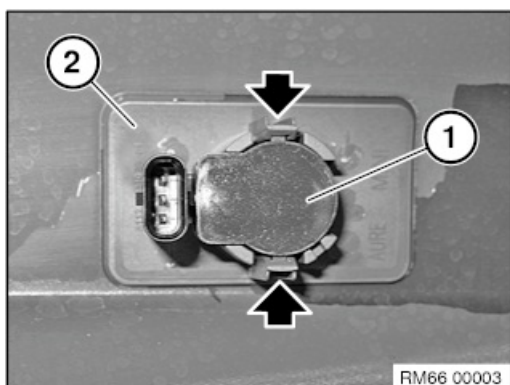
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Necessary preliminary work:

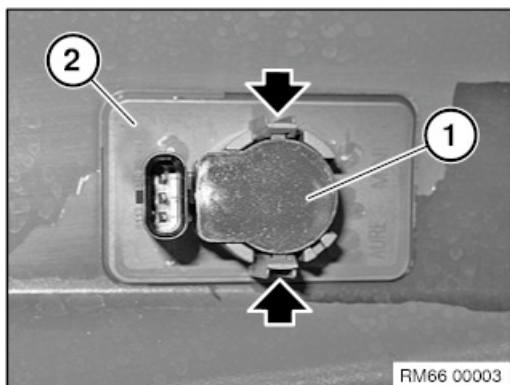
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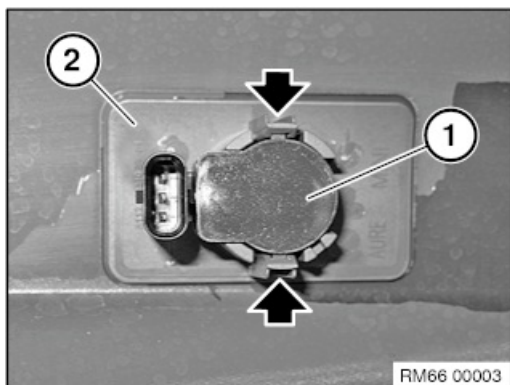
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00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



Warning!

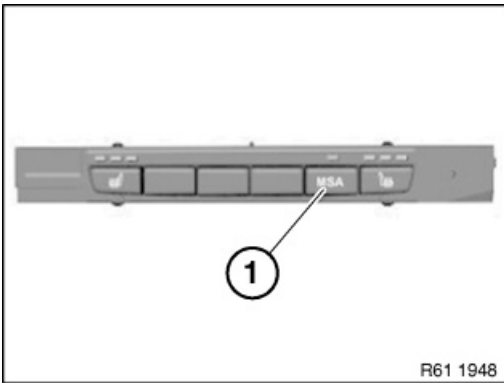
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

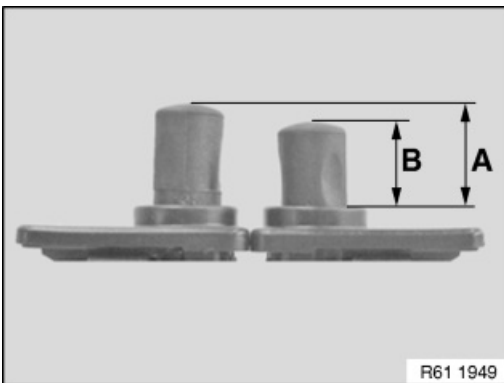
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
 - Workshop mode
 $A = 10 \text{ mm}$
 - Basic setting (engine hood/bonnet open)
 $B = 7 \text{ mm}$

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



When working with diagnosis tools:

- Observe instructions in diagnosis tool





Note:

For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) Service Information (bulletin) 61 01 07 335
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) Service Information (bulletin) 61 01 10 629



00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



Warning!

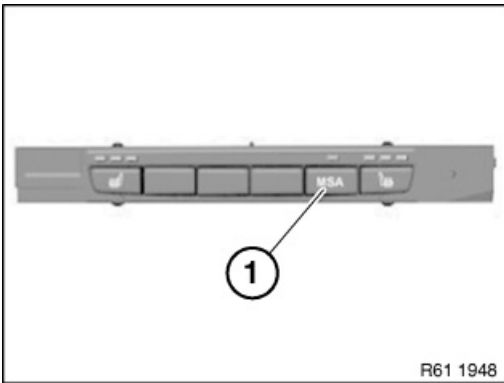
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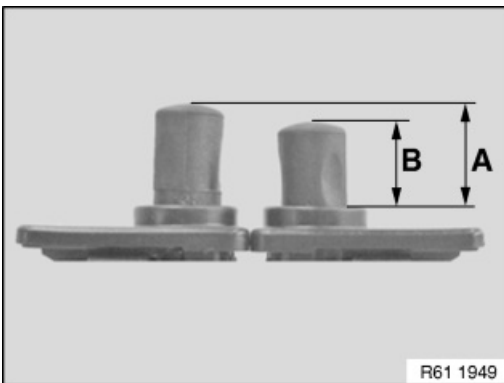
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 - Workshop mode
A = 10 mm
 - Basic setting (engine hood/bonnet open)
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To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



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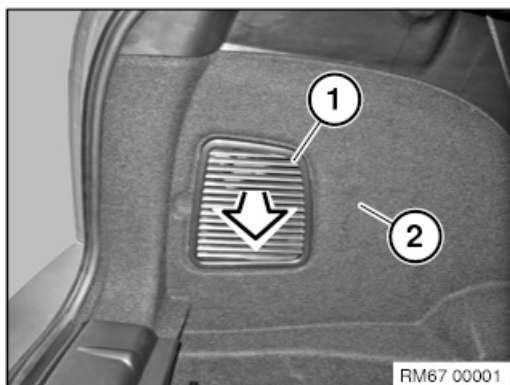


67 11 510 Removing and installing/replacing actuator drive for front left or right door central locking drive

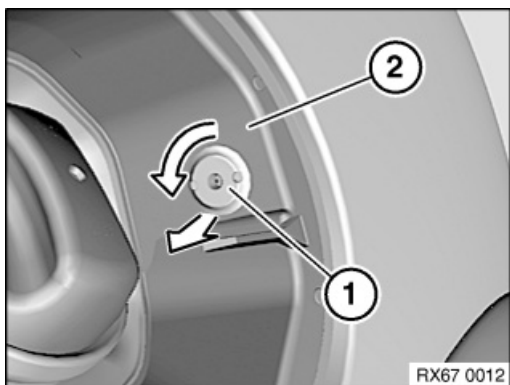


This procedure is described in the document "Removing and installing/replacing door lock in left or right front door".

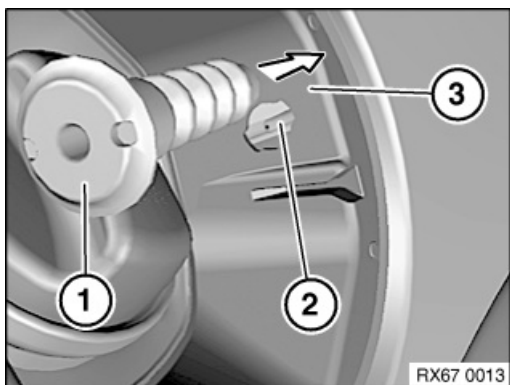




Remove cover (1) in direction of arrow from luggage compartment side panelling (2).



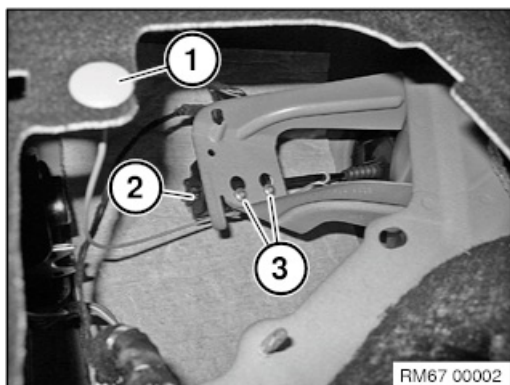
Turn sleeve (1) with a suitable tool approx. 45° in direction of arrow and pull out of receptacle (2).



Installation note:

Slide sleeve (1) over fuel filler flap locking pin (2).

Make sure sleeve (1) is correctly engaged in cover housing (3).

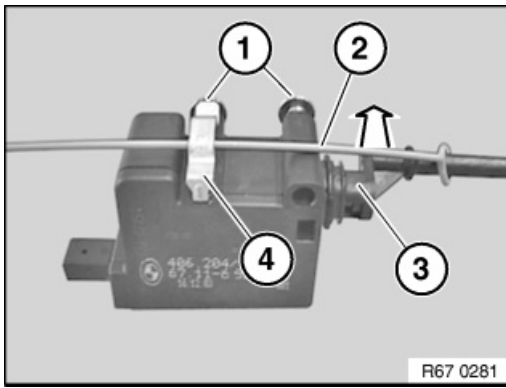


Disengage emergency release mechanism (1).

Slacken screws (2), do not release fully.

Carefully feed out the actuator drive (2).





Replacement:

Release screws (1).

Disengage emergency operation tensioning strap (2) from clamp (4) and remove towards front.

If necessary, unclip locking pin (3) in direction of arrow from actuator drive for tank filler flap.

Unclip clamp (4) from actuator drive for tank filler flap (3).





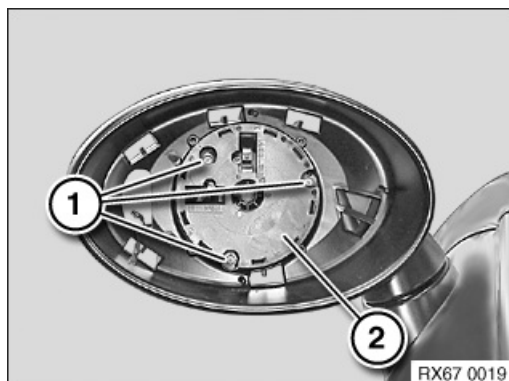
Procedure is described in the document "Removing and installing/replacing tailgate lock".





Necessary preliminary tasks:

- Remove mirror glass



Release screws (1).

Remove drive (2) and disconnect associated plug connection.

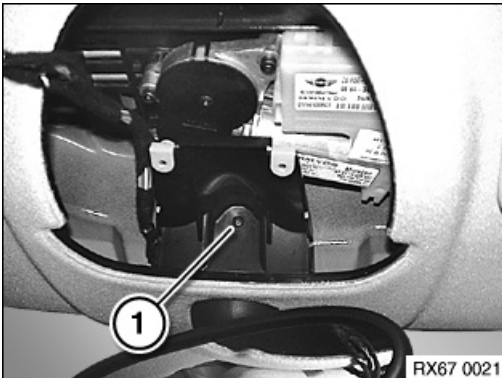


**Important!**

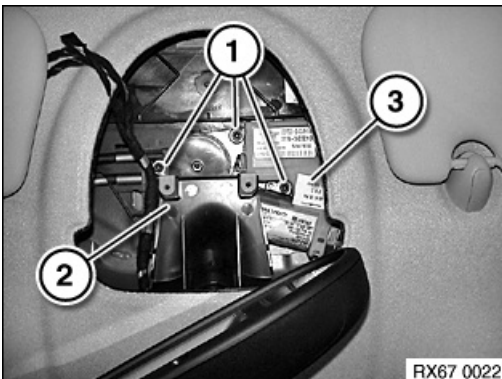
Read and comply with notes on protection against damage from electrostatic discharge (ESD protection) .

*Necessary preliminary tasks:*

- Remove roof operating unit



Release screw (1).



Release screws (1).

Press bracket (2) downward slightly.

Feed out drive (3) and disconnect associated plug connection.

Replacement:

Carry out programming/encoding .

Initialise slide/tilt sunroof .



**Warning!**

Danger of injury!

There is no anti-trap mechanism during initialisation.



An **initialisation** must be performed:

- In the event of malfunctions, e.g. no toll function, no opening or if available no convenience function is possible
- Following replacement of drive for power window regulators
- After work is carried out on the power window mechanism
- If necessary, after an open circuit, e.g. disconnection of the battery or disconnection of the power supply to the door
- After the door window glass has been removed and installed or replaced
- After adjusting procedure on the door window glass
- After adjusting procedure on the convertible top
- After replacement of seals



Initialisation is performed on the power window switch of the relevant door.

Requirements for correct initialisation:

- Terminal "R" activated
- Doors and windows closed
- Sufficient battery voltage; connect charger if necessary

Initialisation comprises:

- Erasure of initialisation
- Reinitialisation





Deleting the initialisation:

- Move the door window into centre position
- Disconnect the plug connection for flat motor power window regulator or remove the plug connection for flat motor power window regulator.
- Operate the power window switch several times

This clears initialisation of the power window. Anti-trapping protection and one-touch control (toll) function are inactive.

Check whether one-touch control (toll) function is inactive, otherwise repeat procedure.

Re-initialisation:

- Open door window glass fully
- After the lower end position has been reached without interruption, move to the upper block and hold the switch for at least 2 seconds in the "close" position (second switch position)

This completes initialisation.

Note:

Carry out function check (toll function, anti-trapping protection and, if necessary, convenience function).



Note:

The power windows can also be initialised in the BMW diagnosis system by means of a diagnosis job.

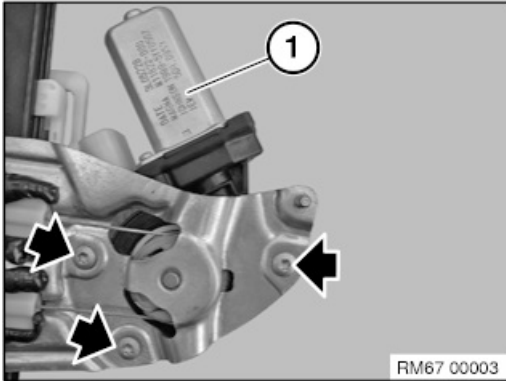


67 62 000 Removing and installing or replacing flat motor for front left or right power window regulator



Necessary preliminary work:

- Remove power window unit in front door



Release screws at marked points.

Remove flat motor (1).



After installation:

Run a function check.

Flat motor does not have to be initialized.

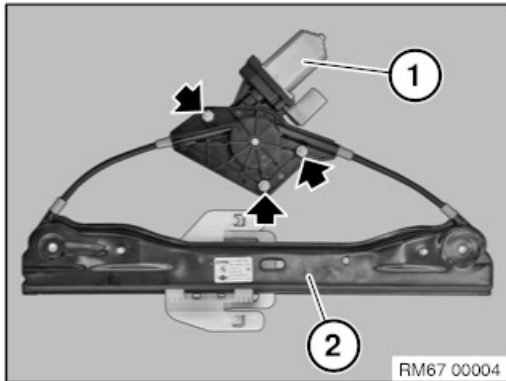


67 62 020 Removing and installing/replacing flat motor for rear left or right power window regulator



Necessary preliminary work:

- Completely remove power window regulator at rear



Release nuts at marked points.

Remove flat motor for power window unit (1) from power window unit (2) in direction of arrow.





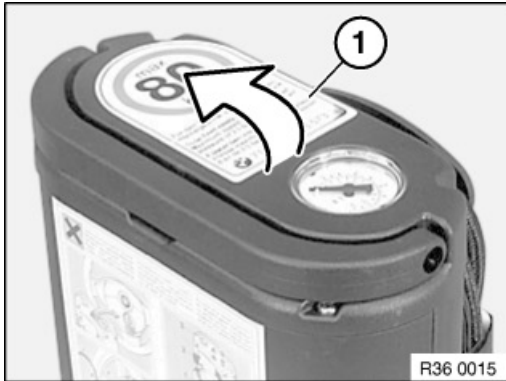
This procedure is described in the document "Removing and installing console for windscreen wiper system complete with motor".



Note:

This work step describes how the sealant bottle is replaced within the framework of inspection (M-Mobility system not used).

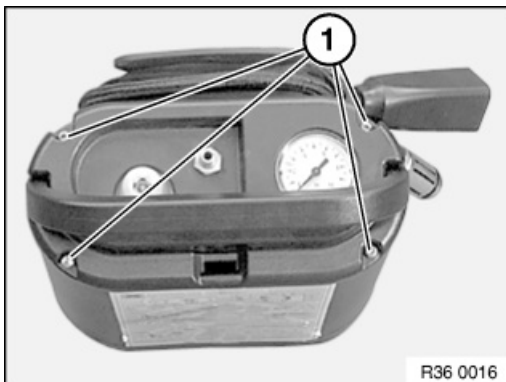
If the M-Mobility system has been used, also replace the transparent tyre inflation hose.



Remove seal film (1). Not necessary if M-Mobility system has already been used.

Installation:

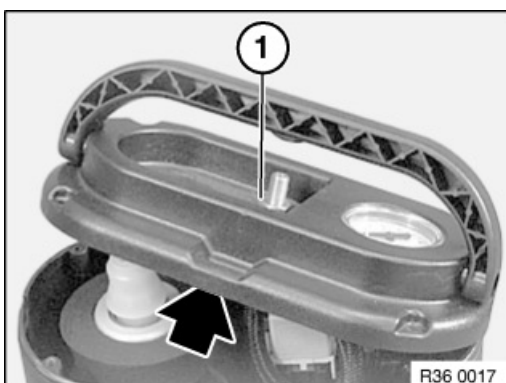
Replace seal film.



Release Torx threaded bolts (1) and raise cover as far as possible.

Installation:

Tightening torque, 36 12 1AZ.

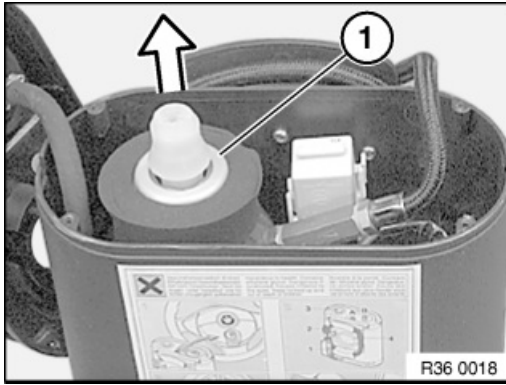


Release hexagon nut (1), grip nut firmly from underside.

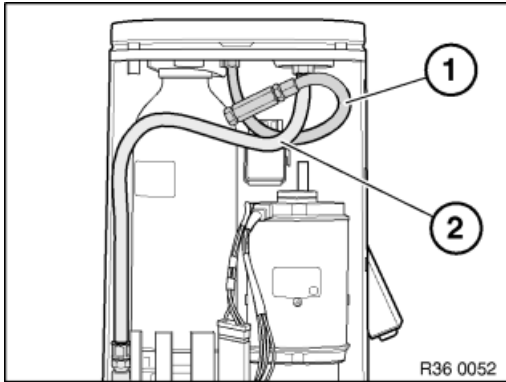
Installation:

Tightening torque, 36 12 2AZ.

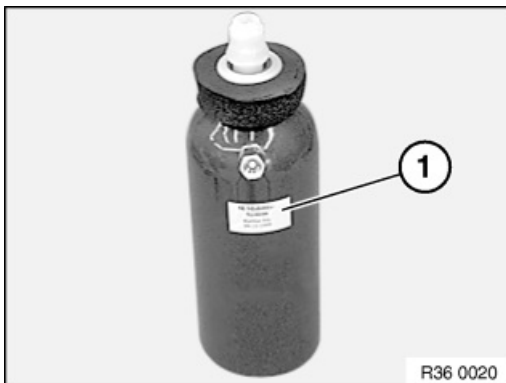




Lift sealant bottle out.



Ensure that hose is laid without any kinks.



Note:

Note the expiration date when installing a new sealant bottle.

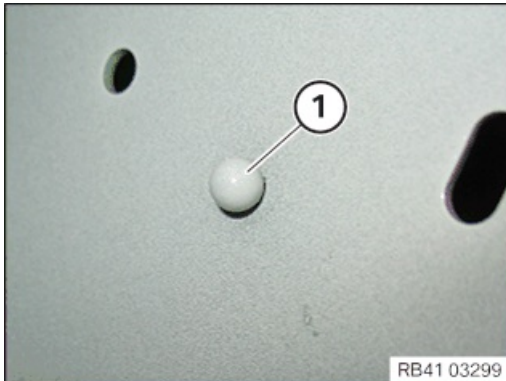


72 11 ... Checklist for front seat

Event		Check	Action
Has at least one belt tensioner and/or one side airbag been activated?	Yes	Check 1 (when installed): Check all seat adjustment options of both front seats. There must be no stiff movement, sticking or other functional problems or noises across the entire adjustment range of all the seat adjustment options. Check head restraints for damage. Check crash-active headrest for activation. Only 2-door model: Check backrest lock. Backrest must unlock and lock easily without any great physical effort.	If components are OK with regard to checks 1 and 2, only replace activated belt tensioner or side airbag. Otherwise, replace faulty parts on the seat/body. Replace belt tensioner, seat belt and, if necessary, side airbag.
		Check 2 (when dismantled): Check for deformation/damage on the following components: 1. All seat cross members on the body 2. Threaded support sleeves in the seat cross members 3. End fittings on the seat mechanism. Check for visible damage or deformation.	
	No	Check all adjustment options of the head restraints. Check crash-active headrest for activation.	Replace faulty parts.
Only seat with integrated seat belt:			
Does the backrest indicator light turn on when the backrest is locked and also when the backrest is shaken?	Yes	Check microswitch of backrest lock and renew if necessary. Check electrical lines and repair if necessary.	If there is still a fault, replace the entire seat
	No	No further action necessary.	



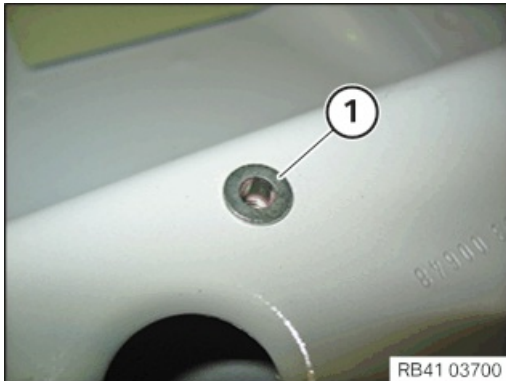
Note: On BMW and MINI bodies, various welded and pushed in bolts are being used.



Single ball/double ball (version 1):

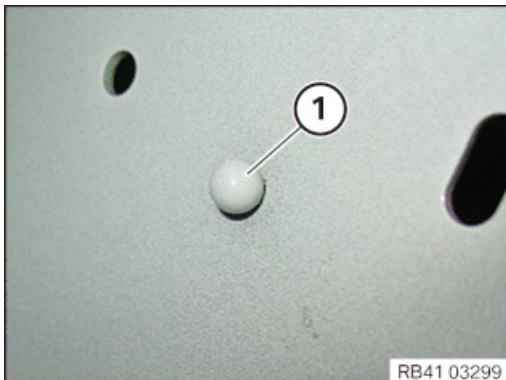
Grind off any residues of the single ball (1), if applicable.

Drill hole with diameter 7 mm.



Set blind rivet nut (1).

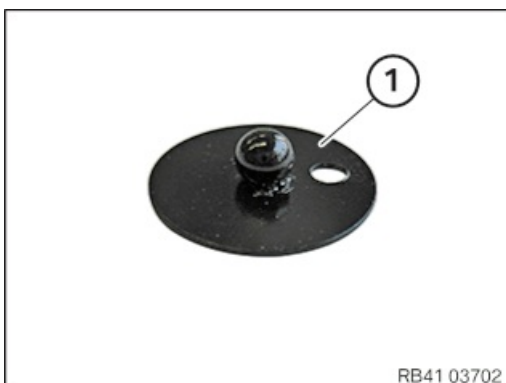
Screw in single ball with thread until a height of 5 mm (double ball 10 mm) is reached.



Single ball/double ball (version 2):

Grind off any residues of the single ball (1), if applicable.

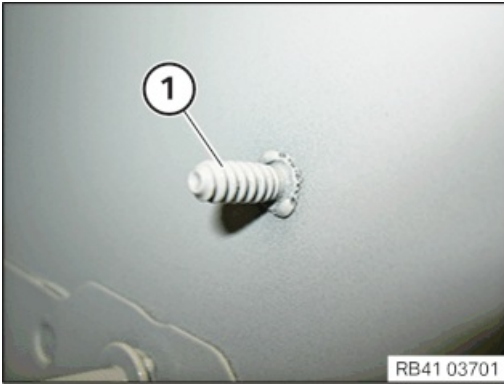
Clean area with solvent cleaner R1.



Clean bonding surface of repair element single ball (1) with solvent cleaner R1.

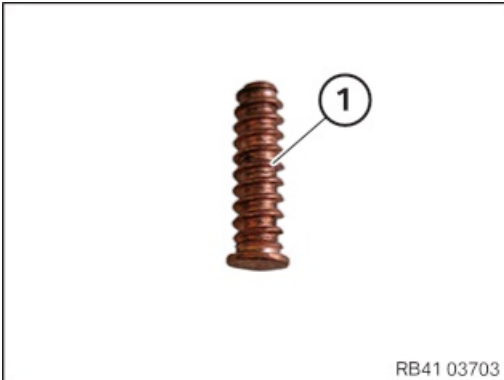
Bond repair element optionally with adhesive K1, K5 or window pane adhesive at the same position.



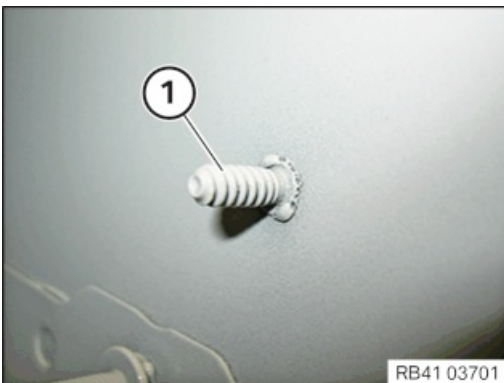


Coarse threaded bolt (version 1):

Grind off any residues of the coarse threaded bolt (1), if applicable.



Spot weld coarse threaded bolt to same position.



Coarse threaded bolt (version 2):

Grind off any residues of the coarse threaded bolt (1), if applicable.

Drill hole with diameter 7 mm.

Set blind rivet coarse threaded bolt using riveting pliers.



72 12 ... Procedure after airbag deployment as result of an accident

Replace all components that were affected by the accident and check all others!

Check and/or replace following components after airbag deployment:

- Components
 - Sensor B-pillar (left/right)
 - Sensor front door (left/right)
 - Sensor seat, Driver-/passenger's side
 - Sensor, pedestrian protection
 - Front sensor (engine compartment)
 - Airbag control unit, vehicle interior
- Procedure
 - Inspect visually for mechanical damage (housing, plug connections). Replace damaged components.
 - Connect BMW diagnosis system
 - Read fault memory
 - Disconnect the vehicle battery and adhere to the waiting period (at least 30 seconds)
 - Rectify faults
 - Reconnect the vehicle battery and adhere to the waiting period (at least 10 seconds)
 - Delete fault memory
 - Switch off ignition and wait at least 2 minutes (no consumers may be switched on during this period such as interior light, radio, etc.)
 - Switch the ignition on (wait for at least 10 seconds)
 - Delete fault memory
 - If you cannot delete the fault memory: Replace the component that is causing the fault

Replace the airbag control unit in the following cases only:

- In the case of visible external damage
- In the case of a corresponding fault memory entry (airbag indicator light is illuminated)

Cables and connectors

- Components and procedure
 - Check cables and connectors for damage, replace if necessary.
(e. g. corrosion, correct engagement, bent pin)

Seat belt system

- Components
 - Automatic reel
 - Seat belt tensioner
 - Seat belt height adjustment
 - Anchor fitting tensioner
 - Seat belt buckle
- Procedure
 - Check components, replace if necessary
 - Additional door lock: Check for foreign body, remove it if necessary.

Seats

- Components
 - Seat
 - Airbag module
 - Active head restraint
- Procedure
 - Check seats (functional check of seat mechanism), replace if necessary



- Check seat connection
- Replace gas generator of active head restraint

If the severity of the crash has not caused any other damage to the seat, only the triggered gas generator needs to be replaced.

External feature: The triggered head restraint is folded forwards and engaged.

The repair work can be carried out in the vehicle with the rear panel removed. The entire system can be pushed back into its original position and the new gas generator installed.

The gas generator can be replaced up to 5 times.

- Replace airbag module and, if necessary, seat cover with upholstery

Driver's airbag

- Components
 - Airbag module
 - Steering Wheel
 - Steering column (if damaged)
- Procedure
 - Replace faulty components
 - Replace steering wheel

Front-passenger airbag

- Components
 - Airbag module
 - Dashboard trim panel (must be replaced with vehicles without replaceable airbag cover!)
 - Supporting tube (if damaged)
- Procedure
 - Check components; replace if necessary

Side airbag, front/rear

- Components
 - Airbag module
 - Door trim panel
 - Door in white
 - Seat
- Procedure
 - Check components; replace if necessary

Head airbag

- Components
 - Airbag module
 - A-pillar trim panel
 - Roofliner
 - Cover, B-pillar (if damaged)
 - C-pillar trim panel (if damaged)
 - Connection/mount (on side frame)
- Procedure
 - Check components; replace if necessary

Knee airbag

- Components
 - Trim panel (driver's side)
 - Lower section of glove box
 - Knee protection (Driver- and passenger's side)
- Procedure
 - Replace faulty components



Passive knee protection

- Components
 - Trim panels (driver's side)
 - Glove box incl. knee protection (passenger's side)
- Procedure
 - Replace faulty components
 - Check retaining elements



41 00 ... Replacing blind rivets



Special tools required:

- 2 348 128
- 72 1 210

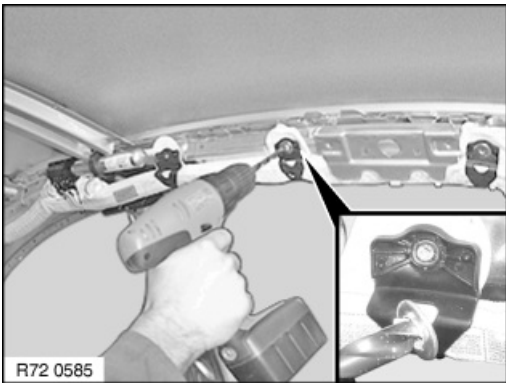


Important!

Lay out protective mats to protect the interior equipment against swarf from the drilled-out rivets and damage.

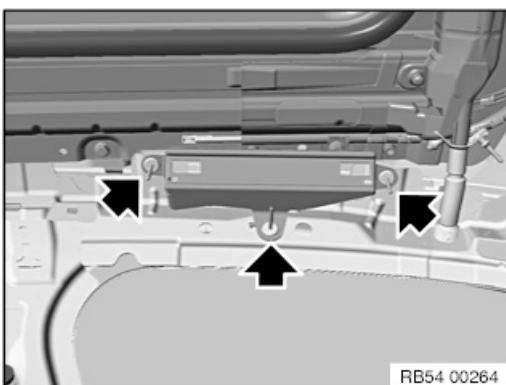
Lay out protective mats in the relevant working area:

- Instrument panel
- Entrance area
- Passenger compartment



Schematic diagram of folding pack holder for head airbag:

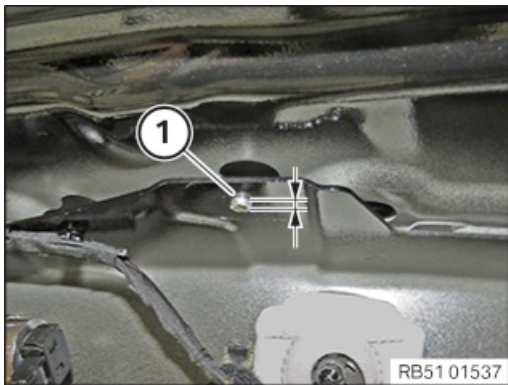
Drill off rivet plate down to rivet shank with a 10 mm twist drill bit.



Described for grab handle holder:

Drill off rivet plate down to rivet shank with a 10 mm twist drill bit.





Drill out all blind rivet protrusions (1) up to the body.



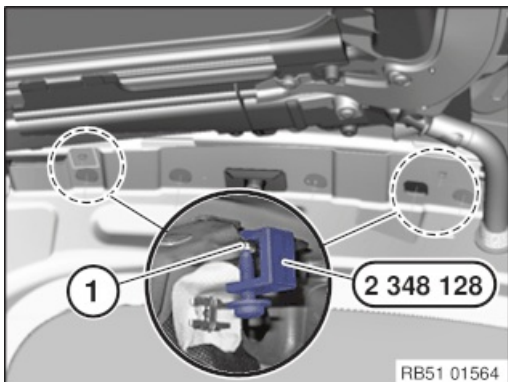
Installation note:

Apply primer to paintwork damages on side frame.

Note:

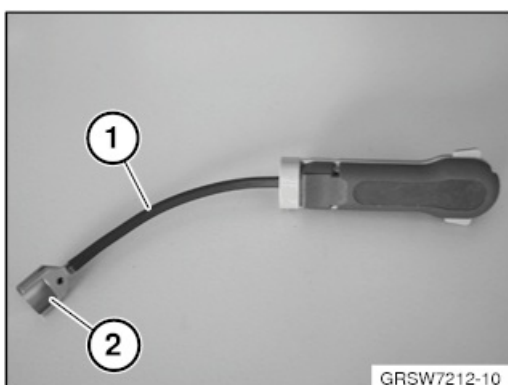
Depending on accessibility, the rivet heads will have to be removed using special tool 2 348 128 or 72 1 210.

In areas that cannot be reached using special tools, cavity foam HS3 must first be applied around the rivet head before the rivet head is then punched out immediately..



Removal of rivet head with special tool 2 348 128:

Press off rivet heads (1) using special tool 2 348 128 and remove.



Removal of rivet head with special tool 72 1 210:

Shank (1) of special tool 72 1 210 is flexible and can be adapted to the relevant body contours.

Note:

Insert butyl in the collecting tray (2) to secure rivet heads and prevent them from falling out.





Insert special tool 72 1 210 through bore hole in body next to attachment points.

Position special tool from rear on rivet head in cavity.

Note:

A second person will be needed to help hold the special tool on the rivet head during the driving-out operation.

Make sure collecting tray is correctly fitted on rivet head.

Drive out stem with hammer and 6 mm punch.

Carefully feed special tool out of body so that rivet head does not fall out of collecting tray.



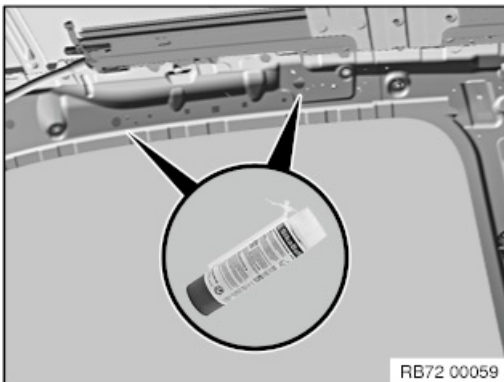
Note:

If the rivet falls out of the collecting tray into the side frame when the special tool is fed out, this area must be generously filled with foam.

For details of procedure for filling cavities with foam, see further operations.

Use cavity preservation (refer to BMW Group Parts) for foam filling.

Cavity foam (refer to BMW Group Parts) may also be used if required.



Fit tube to foam can.

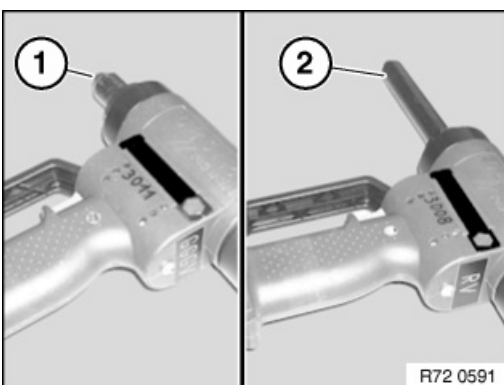
Push the hose in through the pillar holes.

Fill cavity with a filling material.

Warning!

Empty foam can completely onto cardboard and after hardening dispose of foam and can in residual waste.

Can may burst if not completely emptied.



Overview of rivet gun:

Riveting of gas generator housing and holders for folding pack with rivet gun (refer to BMW Workshop Catalogue).

The interchangeable head is changed for the different work operations.

Riveting of gas generator housing with:

- 1.) 17/36 nosepiece and short shank

Riveting of holders for folding pack:

- 2.) 17/40 nosepiece and long shank

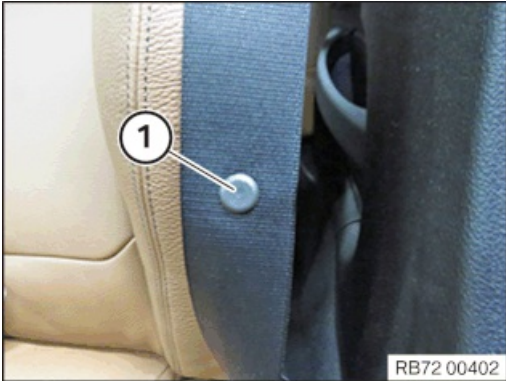


72 00 ... Replacing the seat belt clip



Special tools required:

- 00 5 040



Note:

If the position of the seat belt clip (1) cannot be identified, the position of the seat belt clip on the opposite side of the vehicle is used.

Insert the seat belt clip (1) in the previous position on the seat belt (2).



Mount the counterpiece (1).

Press the seat belt clip with special tool 00 5 040 .

Check that the seat belt clip and counterpiece (1) are firmly seated.

Note:

If the seat belt clip is pressed too firmly, the counterpiece may loosen (1).



72 Safety precautions and general information

Notes on safety

- Safety regulations for handling airbag modules, airbag components and pyrotechnical seat belt tensioners
- >

- Notes on scrapping vehicles with gas generators
- >

- Deactivation/activation pyrotechnical components
- >

Handling electrical system and electronics

- Unlocking/locking airbag plug connections
- >

- Repairing airbag lines
- >

- Handling optical fibres
- >

Check

- Check seat belt
- >

- Checklist for seat belt
- >

Airbag system

- Functional description and checking, refer to Diagnosis system
- >

- Deactivating airbags
- >

- Procedure after airbag deployment.
- >

Active pedestrian protection AFGS

- Procedure after actuator triggering
- >



72 00 ... Safety regulations for handling components with gas generators

It is essential to comply with the regulations as specified in the law relating to the use of explosives when working on airbag units and seat belt tensioners.

Airbags, seat belt tensioners etc. are pyrotechnical objects. Pyrotechnical objects are assigned to different danger classes on the basis of the quantity of propellant that they contain. The assignment can be ascertained from the identification marking on the product:

Important!

Failure to comply with the warning notices and repair instructions for gas generator components can cause accidental deployment and result in injury and vehicle damage!

This applies in particular to the following components:

- Airbag modules (driver's/front passenger airbags, side airbags)
- Buckle/belt tensioner
- Head airbag
- Active knee protection
- Active head restraint
- Safety battery terminal

1. Regulations

The regulations quoted in the following refer to the Federal Republic of Germany.

In all other countries, the relevant legislation and regulations must be observed in each case. Country-specific legal regulations that go beyond this information or court decisions based thereon must be followed in each case or given precedence over these regulations.

The following components used by BMW:

- Pyrotechnical restraint systems are subject to danger class PT1
- Gas generators are pyrotechnical objects belonging to danger class T1

Handling, transporting and storing non-fired gas generators are subject to the "Explosive Materials Act" (law relating to the use of explosives dated 13/09/1976).

The relevant trade supervisory authority must be notified at least 2 weeks before pyrotechnical objects are handled for the first time. Here the relevant authority must be notified in writing of the person responsible (e.g. dealership owner, holder of general power of attorney or if necessary workshop supervisor). A certificate of qualification, i.e. specific training, is not required for the person responsible.

2. Dismantling and installation

- Inspection, testing and installation work may only be carried out by expert trained personnel in BMW Service.
- Work on components of the airbag system should only ever be carried out with the battery disconnected, the negative terminal post covered and the plug connection of the cable leading to the gas generator disconnected. If only the battery is disconnected, the following prescribed waiting period must be observed without fail:
 - 30 min. for vehicles up to 9/93
 - 1 min. for vehicles from 9/93 onward
- In the event of breaks in work, a component with a gas generator that has been removed must be secured against access by other persons.
- Individual components must never be repaired. Instead, always replace them.
- Do not treat airbag system components with cleaning agents or grease.
- Components of the airbag system must not be exposed to temperatures in excess of 75 °C.



- Airbag system components, including electronic diagnostic components, which have been dropped from heights in excess of 0.5 m must not be reinstalled in the vehicles.
- Do not remove components of the airbag system from the original packaging until immediately before they are to be installed in the vehicle.
- Before installing, subject components such as housing, connector pins ,etc. of the airbag system (including diagnosis electronics) to a visual inspection for damage and replace if necessary.
- Airbag system components may only be electrically tested while they are installed and only with the BMW ISTA.
- **Danger of injury:** The airbag module may only be set down with the airbag itself facing *upwards*. Otherwise the alternator will be thrown upwards if it is ignited.
- Do not point the ignition squib of a gas generator at other persons.
- Components with gas generators must not be fired while they are removed. They must be disposed of by special disposal companies or returned to BMW in the packaging of the new components.
- When carrying out straightening and welding work with an electric welder:
 - Disconnect battery
 - Cover negative terminal (post)
- Avoid all contact with the skin when removing a fired airbag module - wear gloves. Wash with water after contact with the skin.

3. Transport

- Components with gas generators must be sent off in the packaging of the new components.

4. Storage

- Observe the regulations of the relevant trade supervisory authority and the applicable national regulations.



72 11 ... Check list for automatic seat belt

Was the automatic seat belt with lower strap replaced after an accident, e.g. frontal and/or oblique collision in which the impact absorbers/deformation elements were permanently deformed? (only while seat belt was fastened)	No	<p>Replace complete automatic seat belt</p> <p>The following must also be checked and replaced, if necessary:</p> <p>seatbelt mounts on the vehicle body</p> <p>seatbelt mounts on the seat</p> <p>seat rails.</p>
Yes		
Does seat belt lock when pulled out suddenly?	No	Replace automatic seat belt (upper seat belt).
Yes		
Does the automatic reel eliminate the belt slack?	No	Replace automatic seat belt (upper seat belt).
Yes		
Can the seat belt strap be pulled out without jamming?	No	<p>Automatic reel is loose - tighten reel.</p> <p>If fault persists:</p> <p>Return spring broken - replace automatic seat belt (upper seat belt).</p>
Yes		
Does the strap on the front seat belts retract automatically? Does the strap on the rear seat belts retract automatically, a small remaining loop is acceptable if this remaining loop is fully retracted when the seat belt strap is readjusted.	No	<p>Automatic reel is loose - tighten reel.</p> <p>Excessive friction in belt guides - replace automatic seat belt (upper strap).</p> <p>Return spring broken - replace automatic seat belt (upper seat belt).</p>
Yes		
Does automatic reel make a squeaking noise when belt is fastened or unfastened?	Yes	<p>Excessive friction in belt guides - replace automatic seat belt (upper strap).</p> <p>Automatic reel is loose - tighten reel.</p> <p>Return spring broken - replace automatic seat belt (upper seat belt).</p>
No		

Is the plastic casing on the belt tongue free from damage in the area of the belt opening?	No	Replace complete automatic seat belt
Yes		



Is the fully extended seat belt strap free from pinches, burn marks, tears and cuts, creasing and unravelling?	No	Replace complete automatic seat belt
Yes		
When the seat belt is fastened, is the belt tongue ejected by spring pressure from the buckle when the "red button" is pressed?	No	Replace complete automatic seat belt
Yes		
Does fastened seat belt lock during emergency braking on a dry roadway at double walking speed?	No	Replace complete automatic seat belt
Yes		
Is fully pulled-out seat belt strap free of serious dirt and other marks?	No	If dirt and marks cannot be removed with commercially available mild detergent, the automatic seat belt (upper seat belt) must be replaced.
Yes		
In the case of seat-integrated seat belts, is front tongue of reclining mechanism or seat rail free of deformation?	No	Replace both damaged parts and complete automatic-reel seat belt. The following must also be checked and replaced, if necessary: seatbelt mounts on the vehicle body seatbelt mounts on the seat seat rails.
Yes		
The automatic seat belt is OK!		



72 11 ... Checking automatic seat belt

General considerations when checking seat belts:

The seat belts must be checked after an accident.

For the check, you should start by trying to get information on which seats in the vehicle involved in the accident were occupied. If this is not possible, check *all* the seat belts in the vehicle and replace them if necessary.

In the event of deformations on the vehicle, you must subject the components of the restraint system affected in this area such as e.g.

- Seat belt
- Anchor fitting tensioner
- Seat belt height adjustment
- Belt buckle tensioner
- Triggering sensors
- etc.

to a function check and a visual inspection.

If you are in any doubt as to the unimpaired operability of restraint system components, these components must be replaced in the interests of safety!

If a seat belt has to be replaced following an accident (e.g. in the event of a frontal and/or oblique collision with permanently deformed impact absorbers/deformation elements or cross-members), the complete seat belt must be replaced! The complete seat belt comprises:

- Upper seat belt
- Lower strap
- Anchor fitting tensioner
- Seat belt buckle (buckle tensioner)
- Seat belt height adjustment
- Mounting bolts of all components

The following must also be checked and if necessary replaced:

- seatbelt mounts on the vehicle body
- Seatbelt mounts on the seat
- seat rails.
- Seat structure (frame, etc.)

Alignment tests on the seat and the seat rails are not permitted!

The following explanations and the checklist for the automatic seat belt can provide help.

An unusable seat belt or a seat belt worn in a serious accident should be destroyed immediately after removal to guarantee that it can not be used again.

Checking automatic reel and seat belt strap:

The automatic reel has two independent activation systems for seat-belt locking.

The first activation system locks the automatic reel when driving quickly around curves, driving in tight curves, on extreme inclinations (vehicle rolls over) and during sharp braking or crash.

To check, the seat backrest must be placed in the upright position and both hands held in a supporting position close to the steering wheel. The brakes are then operated with full intensity while driving on a dry roadway and at double walking speed.

The seat belt must lock.

The second activation system provides additional safety and is controlled by inertia mass.

If the reel locks when the seat belt strap is pulled out suddenly, this system is also OK.



In addition, the automatic electric reel (EMA) must eliminate belt slack.

Check whether an attempt was made to eliminate belt slack:

- Enter, close doors and latch seat belt buckle contact, left
- EMA eliminates belt slack

If belt slack was not eliminated, the procedure described below must be followed:

- Allow vehicle to assume complete sleep mode and repeat the functional check.
- All doors must be closed!
- EMA, left, must be installed and connected correctly.
- Work through all fault entries before the functional check is carried out again.

Replace defective or actuated automatic electric reels.

Automatic reel does not require servicing and must not be opened.

Precondition for complete, problem-free retraction of seat belt straps:

- The seat belt straps must not be twisted!
- The seat belt straps must not be damaged!

When placed to one side, the seat belt straps of the front seats must retract fully.

With the seat belt straps in the rear seat bench, a small remaining loop is acceptable due to increased friction between the strap and the rear seat bench cover if:

- this remaining loop is fully retracted when the seat belt strap is reguided.

Seat belt strap should only be cleaned with a lukewarm soap solution or a commercial mild detergent.

Seat belt strap must never be cleaned chemically or dyed.

The automatic reel and seat belt strap must be replaced in the event of:

1. creasing
2. unravelling
3. pinches
4. cracks and tears
5. traces of melting
6. traces of wear on coating of buckle tongue or on seat belt guide loop.

Checking lower strap (belt buckle tensioner):

To fasten a seat belt, the buckle tongue should insert easily and with a loud click in the lock.

When the "Red button" is pressed, the buckle tongue must be ejected from the lock under spring pressure.

If the seat belt buckle cover is missing or damaged, the lower strap must be replaced.

Replace the triggered belt buckle tensioner including the complete seat belt with seat belt height adjustment and mounting bolts and check the

- seatbelt mounts on the vehicle body
- Seatbelt mounts on the seat
- seat rails.
- Seat structure

Criteria for a triggered mechanical belt buckle tensioner:

- very low position of seat belt buckle (comparisons with new part).

Criteria for a triggered pyrotechnical belt buckle tensioner:

- very low position of seat belt buckle (comparisons with new part).
- Airbag indicator light permanently lit: read out airbag system fault memory.

The belt buckle tensioners can be triggered under certain circumstances even when the seat is not occupied.



If it is definite that the seat belt system was not used (seat was not occupied), there is no need to replace the

- Upper seat belt
- Add-on parts (seat belt height adjustment, screws)
- seatbelt mounts on the vehicle body
- Seatbelt mounts on the seat
- seat rails.

after a check.

Checking end fitting pretensioner:

Replace the triggered end fitting pretensioner including the complete seat belt with seat belt height adjustment, lower strap and mounting bolts and check the

- seatbelt mounts on the vehicle body
- Seatbelt mounts on the seat
- seat rails.
- Seat structure

Criteria for a triggered end fitting pretensioner:

- A triggered end fitting pretensioner can be recognised from the wrapped seat belt strap around the shaft.
- Airbag indicator light permanently lit: read out airbag system fault memory.



72 11 ... Checklist for front seat

Event		Check	Action
Has at least one belt tensioner and/or one side airbag been activated?	Yes	Check 1 (when installed): Check all seat adjustment options of both front seats. There must be no stiff movement, sticking or other functional problems or noises across the entire adjustment range of all the seat adjustment options. Check head restraints for damage. Check crash-active headrest for activation. Only 2-door model: Check backrest lock. Backrest must unlock and lock easily without any great physical effort.	If components are OK with regard to checks 1 and 2, only replace activated belt tensioner or side airbag. Otherwise, replace faulty parts on the seat/body. Replace belt tensioner, seat belt and, if necessary, side airbag.
		Check 2 (when dismantled): Check for deformation/damage on the following components: 1. All seat cross members on the body 2. Threaded support sleeves in the seat cross members 3. End fittings on the seat mechanism. Check for visible damage or deformation.	
	No	Check all adjustment options of the head restraints. Check crash-active headrest for activation.	Replace faulty parts.
Only seat with integrated seat belt:			
Does the backrest indicator light turn on when the backrest is locked and also when the backrest is shaken?	Yes	Check microswitch of backrest lock and renew if necessary. Check electrical lines and repair if necessary.	If there is still a fault, replace the entire seat
	No	No further action necessary.	



72 11 041 Removing and installing/replacing front left or right lower strap (seat belt tensioner)



Warning!

Read and comply with safety regulations for handling airbag modules and pyrotechnical belt tensioners.

Improper handling can lead to triggering of the pyrotechnical seat belt tensioner or side airbag, resulting in injuries.

Switch off the ignition!



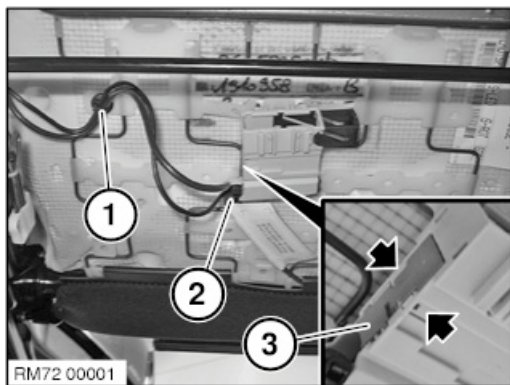
Installation note:

- Microencapsulated screws must be replaced and may not be reused
- Screw connection must be completed within 20 minutes (start of curing)
- Microencapsulated screws must not be retightened
- Clean thread of nut beforehand in event of repeated use



Necessary preliminary tasks:

- Remove left or right front seat.



Detach cable straps (1) on clip.

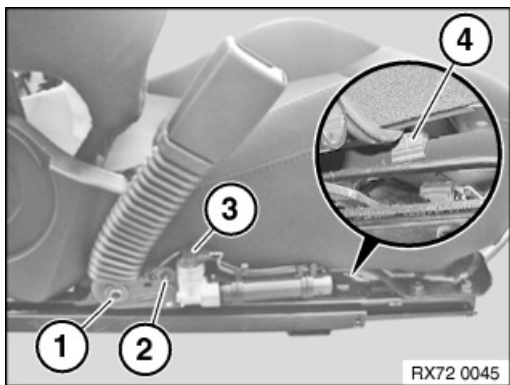
Cut open cable strap (2).

Unlock connector (3) and pull out of connector housing.

Feed wiring harness of belt tensioner out of seat mechanism.

Installation note:

Replace faulty cable straps.



Unlock plug connection (3) and disconnect.

Lever clamp (4) out of seat mechanism.

Release screw (1).

Tightening torque 72 11 09AZ.

Installation note:

Belt tensioner is coded against incorrect assembly (2).

Replace screw (1).



72 11 041 Removing and installing/replacing front left or right lower strap (US version only)



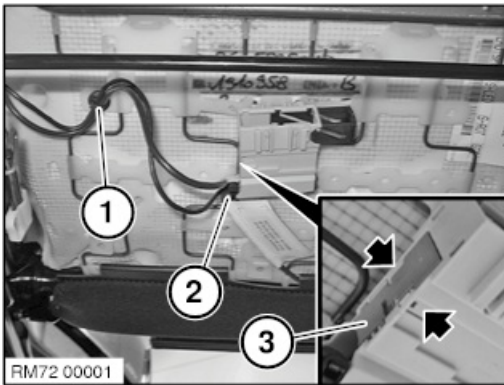
Installation note:

- Microencapsulated screws must be replaced and may not be reused
- The screw connection must be closed within 20 minutes (start of hardening)
- Microencapsulated screws must not be retightened
- Clean thread of nut beforehand in event of repeated use



Necessary preliminary tasks:

- Remove left or right front seat



Detach cable straps (1) on clip.

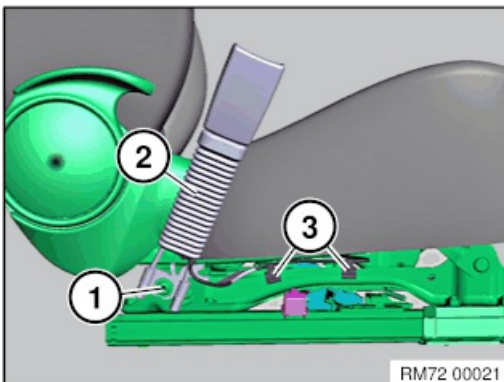
Cut open cable strap (2).

Unlock connector (3) and pull out of connector housing.

Feed wiring harness of lower strap out of seat mechanism.

Installation note:

Replace faulty cable straps.



Lever clamp (3) out of seat mechanism.

Release screw (1).

Tightening torque 72 11 09AZ.

Installation note:

Lower strap fitting (2) is encoded to prevent incorrect installation.

Replace screw (1).



72 11 022
(complete)

Removing and installing/replacing front left or right seat belt



This operation is described in:

- Remove rear seat belt (reel) on front left or right
- Remove lower strap (belt tensioner) front left or right



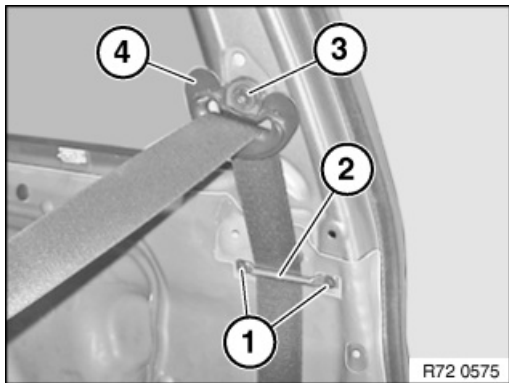
72 11 033 (reel)

Removing and installing/replacing front left or right seat belt



Necessary preliminary tasks:

- Remove trim panel for door post (top)
- Remove entrance cover trim panel.



Release screws (1).

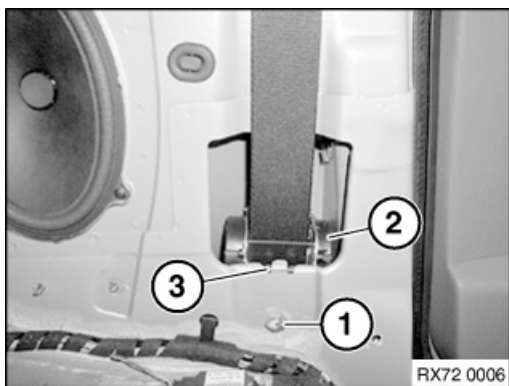
Remove belt deflector (2).

Tightening torque 72 11 15AZ.

Release screw (3).

Remove belt deflection fitting (4).

Tightening torque 72 11 03AZ.



Release screw (1).

Tightening torque 72 11 02AZ.

Remove automatic reel (2).

Installation note:

Automatic reel (2) is coded against incorrect assembly (3).

Replace screw (1) and insert with Loctite.



72 11 033 Removing and installing/replacing front left or right seat belt (reel) (US version only)



Warning!

Read and comply with safety regulations for handling airbag modules and pyrotechnical belt tensioners.

Improper handling can lead to triggering of the pyrotechnical seat belt tensioner or side airbag, resulting in injuries.

Switch off the ignition!



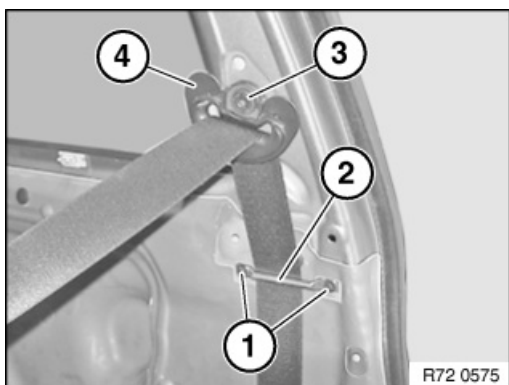
Installation note:

- Microencapsulated screws must be replaced and may not be reused
- Screw connection must be completed within 20 minutes (start of curing)
- Microencapsulated screws must not be retightened
- Clean thread of nut beforehand in event of repeated use



Necessary preliminary tasks:

- Remove trim panel for door post (top)
- Remove entrance cover trim panel.



Release screws (1).

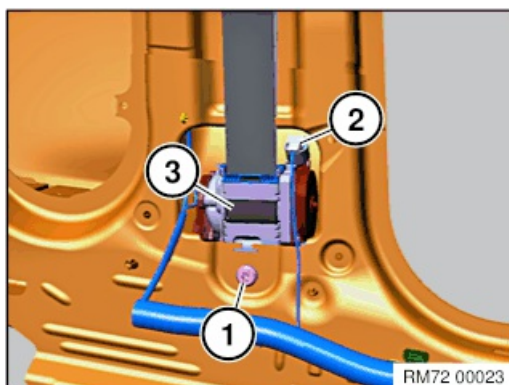
Remove belt deflector (2).

Tightening torque 72 11 15AZ.

Release screw (3).

Remove belt deflection fitting (4).

Tightening torque 72 11 03AZ.



Release screw (1).

Tightening torque 72 11 02AZ.

Unfasten plug connection (2) and disconnect.

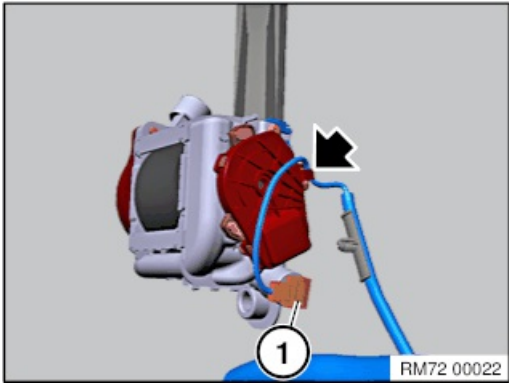
Remove inertia reel mechanism (3).

Installation note:

Automatic reel (2) is coded against incorrect assembly (3).

Replace screw (1).





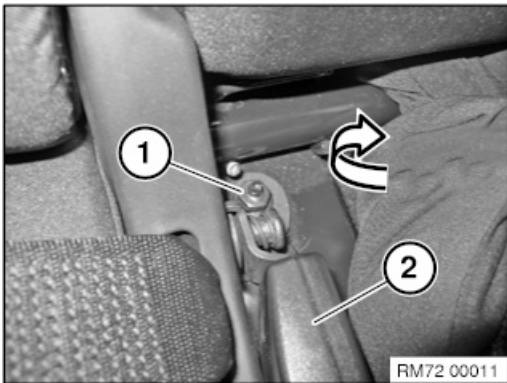
Unfasten plug connection (1) and disconnect.





Installation note:

- Microencapsulated nuts (Loctite) must be replaced and may not be reused
- Screw connection must be completed within 20 minutes (start of hardening)
- Microencapsulated nuts must not be retightened
- In the event of repeated use, the thread must first be cleaned



Carefully push the seat cover away to expose the screw point.

Slacken nut (1).

Tightening torque 72 11 08AZ.

Remove lower strap fitting (2).

Installation note:

Lower strap is encoded against incorrect assembly (2).

Replace nut (1).

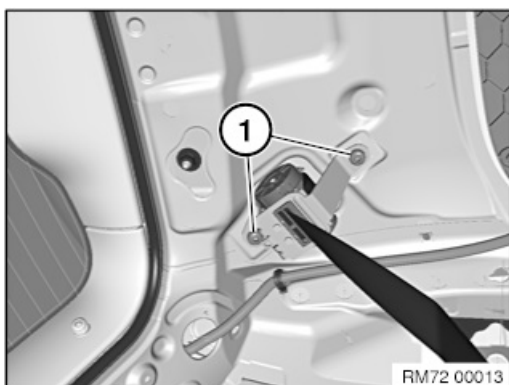


**Necessary preliminary tasks:**

- Lower headlining

**Installation note:**

- Microencapsulated screws must be replaced and may not be reused
- Screw connection must be completed within 20 minutes (start of hardening)
- Microencapsulated screws must not be retightened
- Clean thread of nut beforehand in event of repeated use



Release screws (1).

Tightening torque 72 11 05AZ.

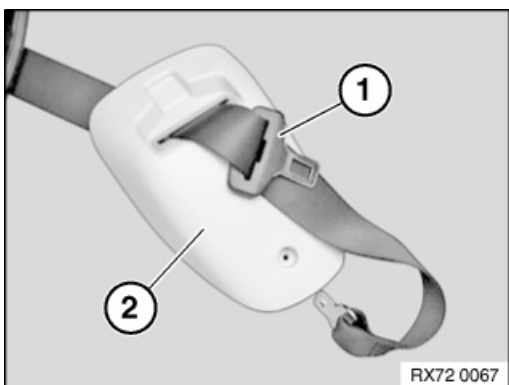
Installation note:

Replace screw.

Remove automatic reel (2).

Installation note:

Retractor mechanism (2) is coded against incorrect installation.



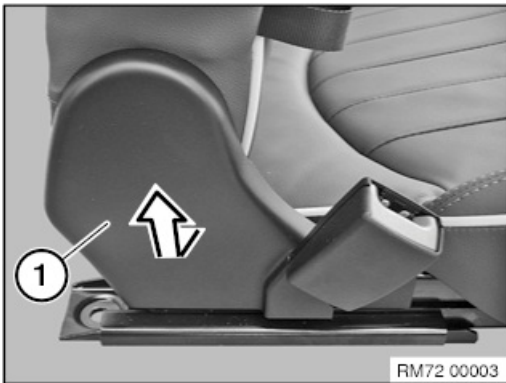
Feed buckle tongue (1) and seat belt strap out of cover (2) for the automatic reel.



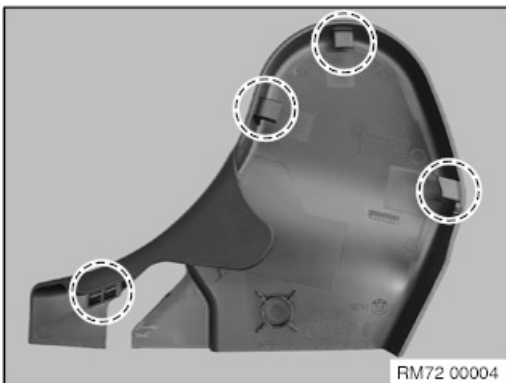


Installation note:

- Microencapsulated screws (Loctite) must be replaced and may not be reused
- Screw connection must be completed within 20 minutes (start of hardening)
- Microencapsulated screws must not be retightened
- Clean thread of nut beforehand in event of repeated use



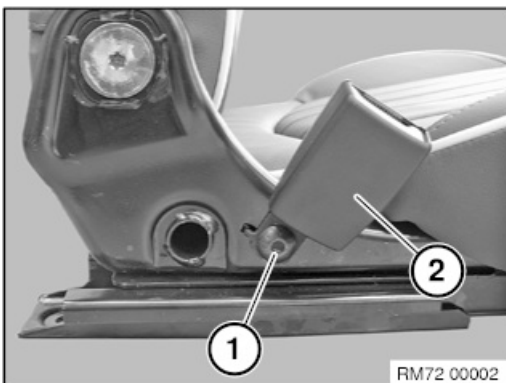
Remove cover (1) in direction of arrow.



Installation note:

Retaining lugs on cover must not be damaged.

Replace cover if necessary.



Release screw (1).

Tightening torque 72 11 08AZ.

Remove lower strap fitting (2).

Installation note:

Replace screw (1).

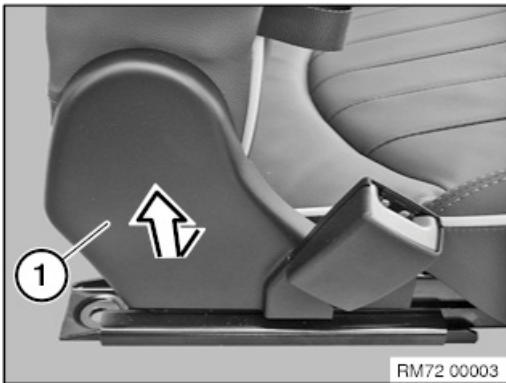
Lower strap is encoded against incorrect assembly (2).





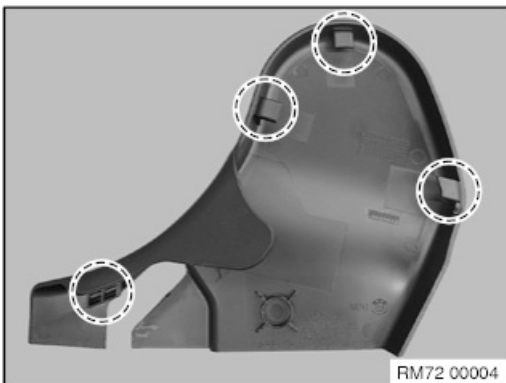
Installation note:

- Microencapsulated screws (Loctite) must be replaced and may not be reused
- Screw connection must be completed within 20 minutes (start of hardening)
- Microencapsulated screws must not be retightened
- Clean thread of nut beforehand in event of repeated use



Lower strap fitting, right:

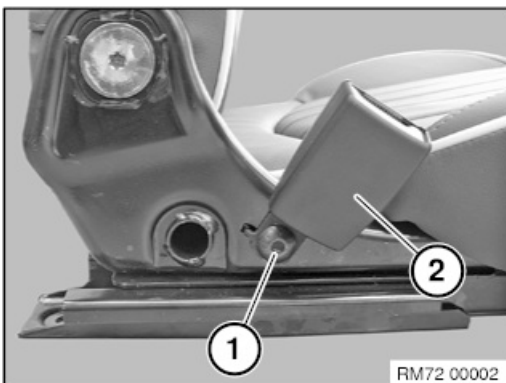
Remove cover (1) in direction of arrow.



Installation note:

Retaining lugs on cover must not be damaged.

Replace cover if necessary.



Release screw (1).

Tightening torque 72 11 08AZ.

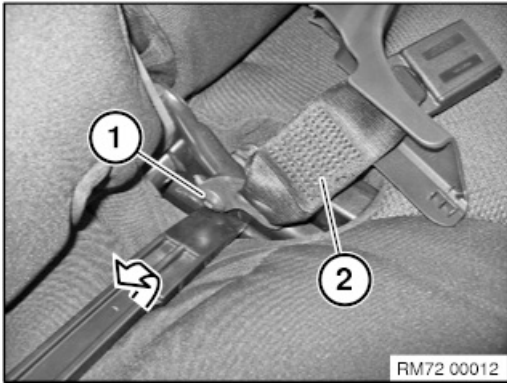
Remove lower strap fitting (2).

Installation note:

Replace screw (1).

Lower strap is encoded against incorrect assembly (2).





Lower strap fitting, left:

Note:

Shown with removed swivel bearing trim removed here for purposes of clarity.

Carefully press off the seat cover with upholstery to expose the screw point.

Release screw (1).

Tightening torque 72 11 08AZ.

Feed lower strap (2) out of swivel bearing trim.

Installation note:

Replace screw (1).

Lower strap is encoded against incorrect assembly (2).



**72 11 100
seater)**

Removing and installing/replacing rear left or right seat belt (4-



This operation is described in:

- Remove rear seat belt (reel) on left or right
- Remove rear lower strap (seat belt buckle) on left or right



**72 11 105
seater)**

Removing and installing/replacing rear left or right seat belt (5-



This operation is described in:

- Remove rear seat belt (reel) on left or right
- Remove left or rear lower strap (seat belt buckle)
- Remove centre rear lower strap (seat belt buckle)





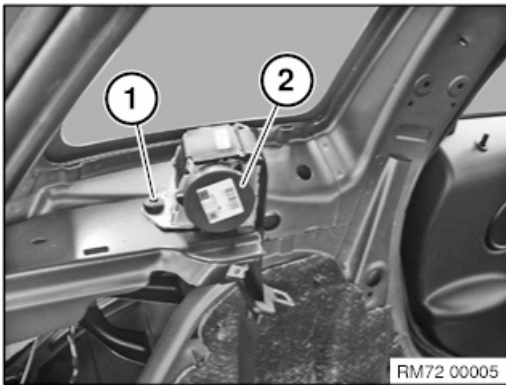
Necessary preliminary work:

- Remove left or right wheel arch panel



Installation note:

- Microencapsulated screws (Loctite) must be replaced and may not be reused
- Screw connection must be completed within 20 minutes (start of hardening)
- Microencapsulated screws must not be retightened
- Clean thread of nut beforehand in event of repeated use



Release screw (1).

Tightening torque 72 11 05AZ.

Remove automatic reel (2).

Installation note:

Automatic reel (2) is encoded against incorrect assembly.

Replace screw (1) and insert with Loctite.



72 Safety precautions and general information

Notes on safety

- Safety regulations for handling airbag modules, airbag components and pyrotechnical seat belt tensioners
- >
- Notes on scrapping vehicles with gas generators
- >
- Deactivation/activation pyrotechnical components
- >

Handling electrical system and electronics

- Unlocking/locking airbag plug connections
- >
- Repairing airbag lines
- >
- Handling optical fibres
- >

Check

- Check seat belt
- >
- Checklist for seat belt
- >

Airbag system

- Functional description and checking, refer to Diagnosis system
- >
- Deactivating airbags
- >
- Procedure after airbag deployment.
- >

Active pedestrian protection AFGS

- Procedure after actuator triggering
- >



**Warning!**

The responsibility for deactivation/activation rests with the customer.

Depending on the assignment of the front passenger seat, the front passenger and side airbags must be (de-)activated in accordance with the Owner's Handbook.



The front passenger airbag can only be deactivated in accordance with the following instructions if the vehicle is equipped with a suitable key switch!

The key switch can be retrofitted if it is missing and has been ordered as an optional equipment.

key switch:

- Optional equipment 5DA for MINI
- Optional equipment 470 for BMW



Only E83 up to 09/2004:

See deactivation of airbags

Only E83 from 09/2004:

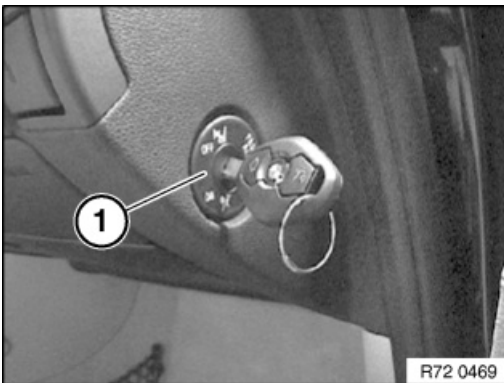
Deactivation using key switch, see following operations

Only R50/R53 up to 04/2004:

See deactivation of airbags

Only R50/R53 from 04/2004 and R52 from series introduction:

Deactivation using key switch, see following operations



The following airbags are deactivated simultaneously with the key switch (1):

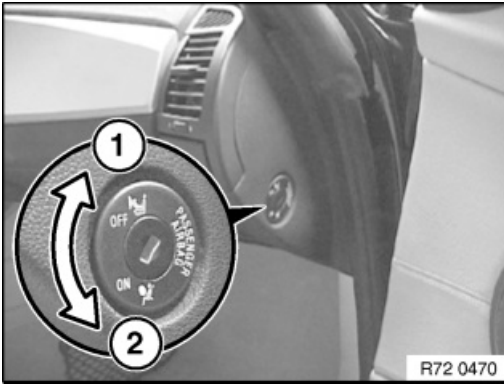
- Front passenger airbag
- Side airbag (front passenger side)
- If necessary, knee airbag in US version (front passenger side)

The airbags can only be deactivated/reactivated while the vehicle is stationary and with the door open.

Important!

The head airbag remains active.



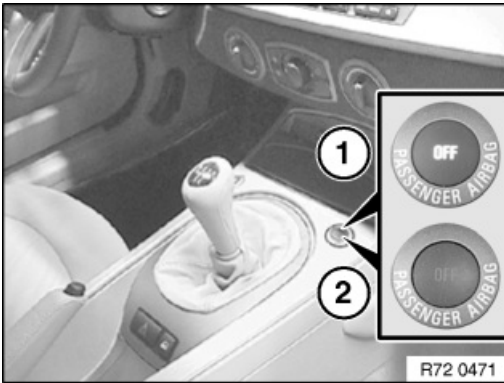


Deactivation

- 1 Turn key switch with ignition key to "OFF" position.
Deactivatable airbags on front passenger side out of operation.
Head airbag on front passenger side remains active.
All airbags on driver's side remain active.

Activation

- 2 Turn key switch with ignition key to "ON" position.
All the airbags in the vehicle are activated and are triggered in appropriate situations.



Indicator light

When the ignition key is turned in the ignition lock, the function of the airbag system is checked and the indicator light in the centre console lights up for several seconds.

- 1 The indicator light is permanently ON when the front passenger airbags are deactivated
- 2 The indicator light goes out after a few seconds when the front passenger airbags are activated



72 12 ... Notes on scrapping vehicles with gas generators (airbag system)

The gas generator is a pyrotechnical component and is for the most part permanently mounted on the following components:

- Airbag module
 - Driver's/passenger airbag
 - Side airbag
 - Head airbag
 - Knee airbag
- Automatic electric reel
- Belt end fitting tensioner
- Belt buckle tensioner
- Safety battery terminal
- Active head restraint

In accordance with accident prevention regulations and specific national regulations, gas generators must be rendered unusable before they are scrapped. This is necessary because pyrotechnical objects can cause injury if improperly activated (e.g. scrapping with flame cutters).

With vehicles which are scheduled for scrapping, it is always essential prior to draining and further stripping work to ensure that all the gas generators **in the vehicle** are fired. The fired gas generators can then be scrapped together with the vehicle.

Gas generators that have not fired constitute a hazard (also to the environment)!

Firing failure:

If correct firing is not possible, the relevant components must be removed and disposed of by special waste disposal companies!

Comply with safety regulations **for handling airbag system components**.

If a triggering operation has failed:

- Disconnect the triggering device from the battery and
- Wait a few minutes before approaching the vehicle

The components of an airbag system must always be disposed of. Such components must not be sold on as used parts.

Firing:

Triggering of the gas generators may only be carried out by expert personnel and under the supervision of a responsible person. Other standard accident prevention regulations (safety goggles, ear defenders etc.) must also be observed.

The gas generators must be fired from the outside in this vehicle which has been earmarked for scrapping. In this process

- the doors must be closed
- the rear lid must be open
- the side windows must be open and
- the sunroof must be open

To fire the gas generators, use the firing device with the appropriate cables (follow instructions).

Warning!

Once gas generators have been fired, observe a ventilation period of 10 minutes with the doors opened. Only then is it permitted to continue work inside the vehicle.



Wear protective goggles and protective gloves when handling a fired gas generator!

The burning of solid fuel will heat up the airbag unit - danger of burning hands!

Wash skin with water after contact with fired gas generators!



72 12 ... Procedure after airbag deployment as result of an accident

Replace all components that were affected by the accident and check all others!

Check and/or replace following components after airbag deployment:

- Components
 - Sensor B-pillar (left/right)
 - Sensor front door (left/right)
 - Sensor seat, Driver-/passenger's side
 - Sensor, pedestrian protection
 - Front sensor (engine compartment)
 - Airbag control unit, vehicle interior
- Procedure
 - Inspect visually for mechanical damage (housing, plug connections). Replace damaged components.
 - Connect BMW diagnosis system
 - Read fault memory
 - Disconnect the vehicle battery and adhere to the waiting period (at least 30 seconds)
 - Rectify faults
 - Reconnect the vehicle battery and adhere to the waiting period (at least 10 seconds)
 - Delete fault memory
 - Switch off ignition and wait at least 2 minutes (no consumers may be switched on during this period such as interior light, radio, etc.)
 - Switch the ignition on (wait for at least 10 seconds)
 - Delete fault memory
 - If you cannot delete the fault memory: Replace the component that is causing the fault

Replace the airbag control unit in the following cases only:

- In the case of visible external damage
- In the case of a corresponding fault memory entry (airbag indicator light is illuminated)

Cables and connectors

- Components and procedure
 - Check cables and connectors for damage, replace if necessary.
(e. g. corrosion, correct engagement, bent pin)

Seat belt system

- Components
 - Automatic reel
 - Seat belt tensioner
 - Seat belt height adjustment
 - Anchor fitting tensioner
 - Seat belt buckle
- Procedure
 - Check components, replace if necessary
 - Additional door lock: Check for foreign body, remove it if necessary.

Seats

- Components
 - Seat
 - Airbag module
 - Active head restraint
- Procedure
 - Check seats (functional check of seat mechanism), replace if necessary



- Check seat connection
- Replace gas generator of active head restraint

If the severity of the crash has not caused any other damage to the seat, only the triggered gas generator needs to be replaced.

External feature: The triggered head restraint is folded forwards and engaged.

The repair work can be carried out in the vehicle with the rear panel removed. The entire system can be pushed back into its original position and the new gas generator installed.

The gas generator can be replaced up to 5 times.

- Replace airbag module and, if necessary, seat cover with upholstery

Driver's airbag

- Components
 - Airbag module
 - Steering Wheel
 - Steering column (if damaged)
- Procedure
 - Replace faulty components
 - Replace steering wheel

Front-passenger airbag

- Components
 - Airbag module
 - Dashboard trim panel (must be replaced with vehicles without replaceable airbag cover!)
 - Supporting tube (if damaged)
- Procedure
 - Check components; replace if necessary

Side airbag, front/rear

- Components
 - Airbag module
 - Door trim panel
 - Door in white
 - Seat
- Procedure
 - Check components; replace if necessary

Head airbag

- Components
 - Airbag module
 - A-pillar trim panel
 - Roofliner
 - Cover, B-pillar (if damaged)
 - C-pillar trim panel (if damaged)
 - Connection/mount (on side frame)
- Procedure
 - Check components; replace if necessary

Knee airbag

- Components
 - Trim panel (driver's side)
 - Lower section of glove box
 - Knee protection (Driver- and passenger's side)
- Procedure
 - Replace faulty components



Passive knee protection

- Components
 - Trim panels (driver's side)
 - Glove box incl. knee protection (passenger's side)
- Procedure
 - Replace faulty components
 - Check retaining elements





Warning!

Read and comply with safety regulations for handling airbag modules and pyrotechnical belt tensioners.

Incorrect handling can activate airbag and cause injury.



Important!

Operations on pyrotechnical devices may only be carried out by authorised experts.

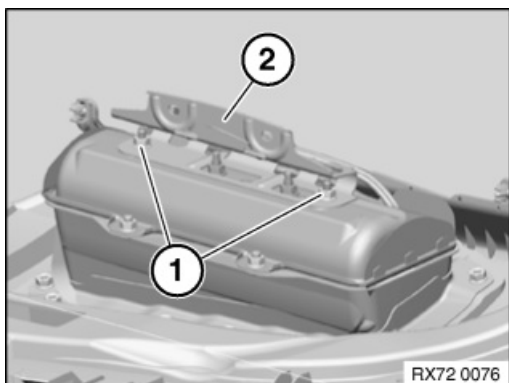
Improper, unauthorised operations may result in serious dangers.

Unauthorised persons are strictly prohibited from performing any operations on this system.



Necessary preliminary tasks:

- Remove dashboard upper part trim panel



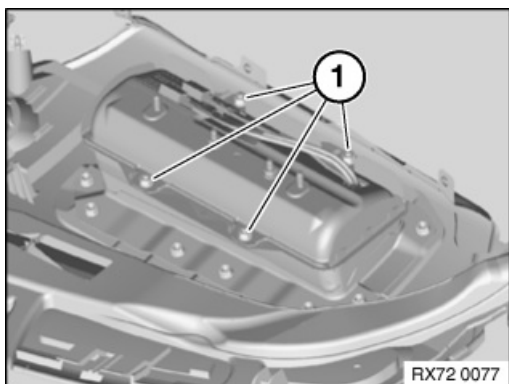
Unscrew nuts (1).

Installation note:

Replace nuts (1).

Tightening torque 72 12 09AZ.

Remove holder (2) for airbag module.



Unscrew nuts (1).

Installation note:

Replace nuts (1).

Tightening torque 72 12 01AZ.

Remove airbag module from dashboard.



**Special tools required:**

- 2 230 142

**Warning!**

Observe safety regulations when handling airbag modules.
Incorrect handling can activate airbag and cause injury.

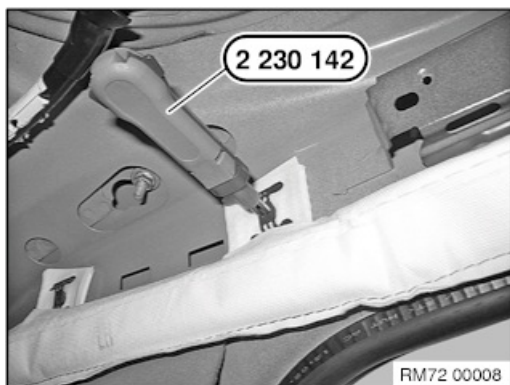
Switch off the ignition!

**Installation note:**

- Microencapsulated screws must be replaced and may not be reused
- Screw connection must be completed within 20 minutes (start of curing)
- Microencapsulated screws must not be retightened
- Clean thread of nut beforehand in event of repeated use

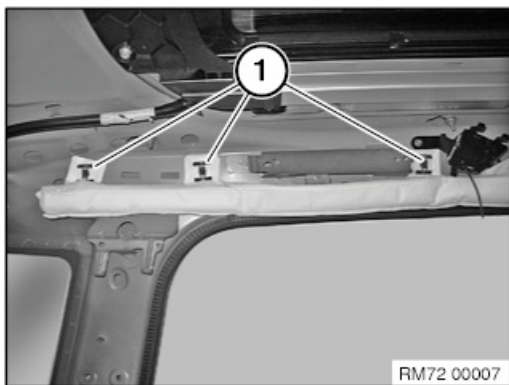
**Necessary preliminary work:**

- Remove headlining
- Disconnect negative battery lead

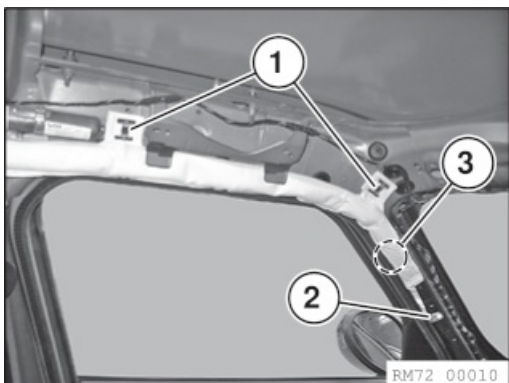


To detach the clamps, use special tool 2 230 142 .





Unlock and remove clamps (1).



Unlock and remove clamps (1).

Release screw (2) for end fitting.

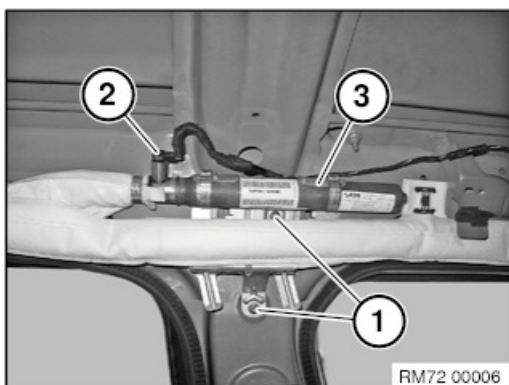
Tightening torque 72 12 08AZ.

Lever out clip in marked area (3).

Installation note:

Replace microencapsulated screws.

Replace clip.



Unfasten plug connection (2) and disconnect.

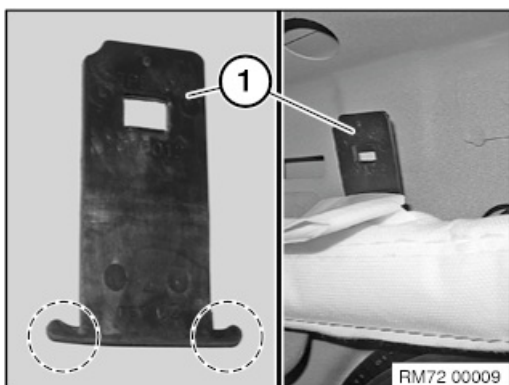
Release bolts (1) and remove holder with gas generator (3).

Tightening torque 72 12 08AZ.

Installation note:

Replace microencapsulated screws.

Gas generator is coded against incorrect assembly.



Installation note:

Make sure holders (1) are fitted correctly.

Retaining lugs must be correctly located in openings of the folding pack.



Important!

Make sure that folding pack cannot be installed twisted.

Folding pack must not be damaged.

Clamps of folding pack must not be damaged.





72 12 006 Removing and installing/replacing airbag module for passenger knee protection



Special tools required:

- 00 9 325



Warning!

Read and comply with safety regulations for handling airbag modules and pyrotechnical belt tensioners.

Incorrect handling can activate airbag and cause injury.



Important!

Operations on pyrotechnical devices may only be carried out by authorised experts.

Improper, unauthorised operations may result in serious dangers.

Unauthorised persons are strictly prohibited from performing any operations on this system.

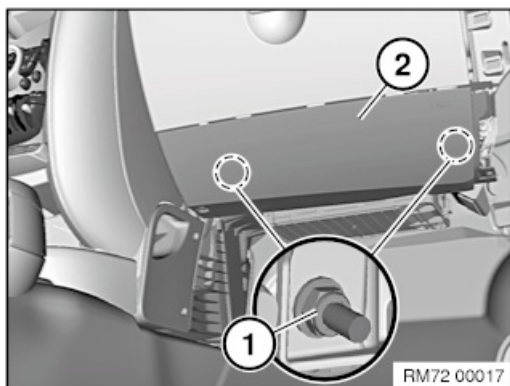


When working on trim panel components, make sure that visible surfaces are not scratched or damaged (e.g. by sharp-edged tools).



Necessary preliminary tasks:

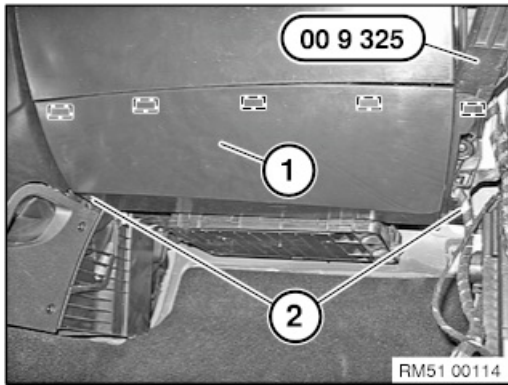
- Disconnect battery earth lead
- Remove front door sill cover strip



Release nuts (1) on rear side of trim panel (2).

Tightening torque 72 12 10AZ.

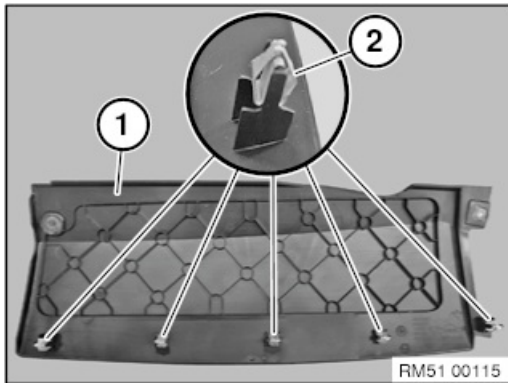




Release screws (2) on trim panel (1).

Using special tool 00 9 325 unclamp trim panel (2) in marked area from outside to inside.

Unlock and disconnect airbag plug connection behind.



Installation note:

Replace faulty retaining clips (2).

Replacement

Modify retaining clips (2) on trim panel (1).



**Warning!**

Read and comply with safety regulations for handling airbag modules and pyrotechnical belt tensioners.

Incorrect handling may activate the pyrotechnical belt tensioner or side airbag and thereby cause injuries.

Switch off the ignition!

**Important!**

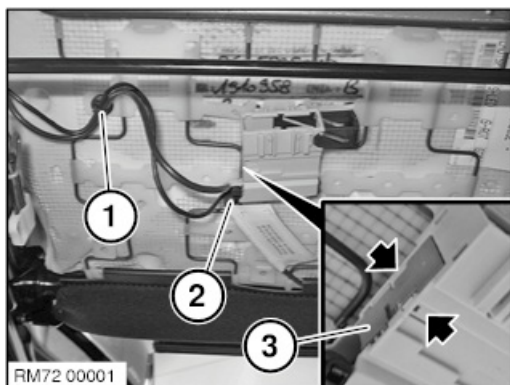
Operations on pyrotechnical devices may only be carried out by authorised experts.

Improper, unauthorised operations may result in serious dangers.

Unauthorised persons are strictly prohibited from performing any operations on this system.

**Necessary preliminary work:**

- Remove front seat



Detach cable straps (1) on clip.

Cut open cable strap (2).

Unlock connector (3) and pull out of connector housing.

Feed wiring harness of airbag module out of seat mechanism.

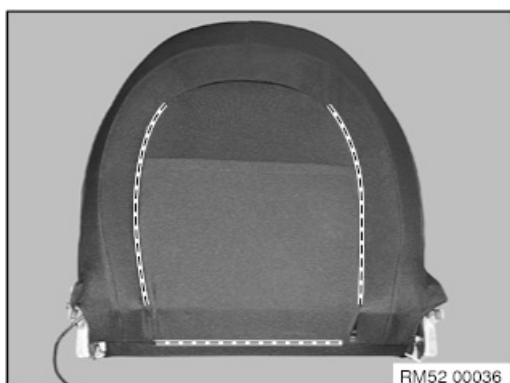
Installation note:

Connectors are coded against incorrect assembly.

Replace faulty cable straps.

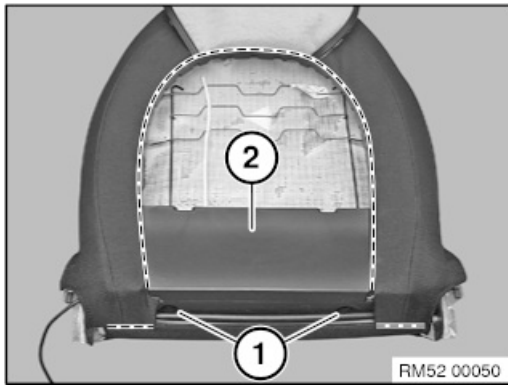
**Warning!**

Feed wiring harness carefully through seat and backrest frames owing to sharpness of edges.

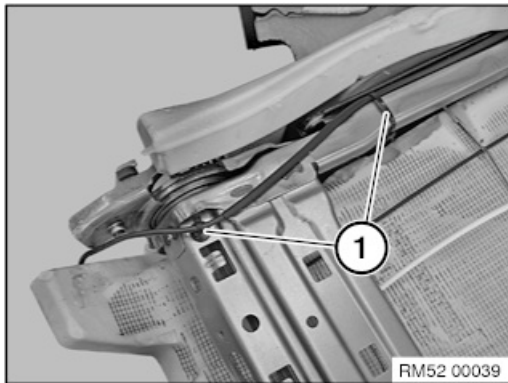


Disengage cover welt in marked area from backrest frame.

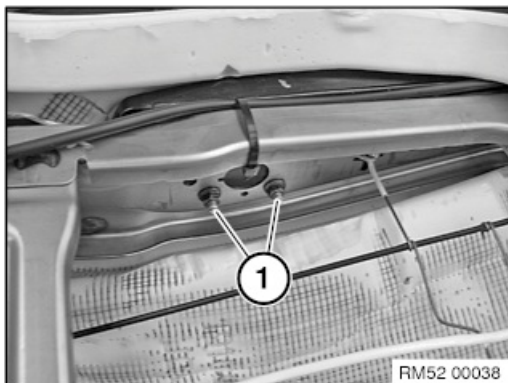




Disengage cover welt in marked area from backrest frame.
Release screws (1).
Remove rear panel (2).



Cut open cable strap (1).
Feed wiring harness out of seat mechanism.
Installation note:
Replace faulty cable straps.



Partially remove backrest cover in working area.
Unscrew nuts (1).
Remove airbag module from backrest frame.
Installation note:
Replace nuts (1).
Tightening torque 72 12 06AZ.



61 00 ... Repairing airbag cables

Important!

Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations for handling components of airbag system.

Instructions for disconnecting and connecting battery.

In event of non-visible damage to wiring harness:

Disconnect plug connection on airbag module or on adapter plug. It is absolutely vital to disconnect the contacts in succession as there is a risk of mixing up (similar parts)! Cut through one cable after the other at an appropriate position, do not under any circumstances cut through both cables at the same time. Insulate cables remaining in wiring harness with insulating tape. Now disconnect plug connection on airbag control unit. Unpin contacts. Cut through one cable after the other at an appropriate position and insulate with insulating tape, do not under any circumstances cut through both cables at the same time. Pin contacts of repair cable for airbag control unit in control unit plug, assignment of repair cables is relevant. Lay repair cable in vehicle parallel to existing airbag lead. Now pin in contacts for airbag control unit or contacts of adapter plug, assignment of repair cables is relevant. Cut off excess length of repair cable in proximity (visible area) of airbag module or of adapter plug. Twist open cables. With the butt connectors and heat-shrink tubings in the Electronic Parts Catalogue (EPC), reconnect the cables with the same cable colours. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (heat-shrink tubing) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

Cutting off and insulating cables.

Repairing a plug connection using butt connectors.

Installing and removing contacts.

In event of visible damage:

Expose cable at damaged areas. Cut through one cable after the other at an appropriate position and insulate cables no longer required in wiring harness with insulating tape, do not under any circumstances cut through both cables at the same time. Now, depending on the scope of work, unpin contacts either on airbag control unit/airbag module or on adapter plug. Cut off unpinned cables. Insulate cables remaining in wiring harness with insulating tape. Now pin in contacts of repair cable, assignment of repair cables is relevant. Lay repair cable in vehicle parallel to existing airbag lead up to separation point. Cut off excess length of repair cable. Twist open cables. Connect cables with butt connectors and heat-shrink tubings in Electronic Parts Catalogue (EPC), assignment of repair cables is relevant. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (heat-shrink tubing) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

Cutting off and insulating cables.

Repairing a plug connection using connectors.

Installing and removing contacts.



61 00 ... **Repairing airbag cables**

Important!

Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations for handling components of airbag system.

Instructions for disconnecting and connecting battery.

In event of non-visible damage to wiring harness:

Disconnect plug connection on airbag module or on adapter plug. It is absolutely vital to disconnect the contacts in succession as there is a risk of mixing up (similar parts)! Cut through one cable after the other at an appropriate position, do not under any circumstances cut through both cables at the same time. Insulate cables remaining in wiring harness with insulating tape. Now disconnect plug connection on airbag control unit. Unpin contacts. Cut through one cable after the other at an appropriate position and insulate with insulating tape, do not under any circumstances cut through both cables at the same time. Pin contacts of repair cable for airbag control unit in control unit plug, assignment of repair cables is relevant. Lay repair cable in vehicle parallel to existing airbag lead. Now pin in contacts for airbag control unit or contacts of adapter plug, assignment of repair cables is relevant. Cut off excess length of repair cable in proximity (visible area) of airbag module or of adapter plug. Twist open cables. With the butt connectors and heat-shrink tubings in the Electronic Parts Catalogue (EPC), reconnect the cables with the same cable colours. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (heat-shrink tubing) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

Cutting off and insulating cables.

Repairing a plug connection using butt connectors.

Installing and removing contacts.

In event of visible damage:

Expose cable at damaged areas. Cut through one cable after the other at an appropriate position and insulate cables no longer required in wiring harness with insulating tape, do not under any circumstances cut through both cables at the same time. Now, depending on the scope of work, unpin contacts either on airbag control unit/airbag module or on adapter plug. Cut off unpinned cables. Insulate cables remaining in wiring harness with insulating tape. Now pin in contacts of repair cable, assignment of repair cables is relevant. Lay repair cable in vehicle parallel to existing airbag lead up to separation point. Cut off excess length of repair cable. Twist open cables. Connect cables with butt connectors and heat-shrink tubings in Electronic Parts Catalogue (EPC), assignment of repair cables is relevant. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (heat-shrink tubing) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

Cutting off and insulating cables.

Repairing a plug connection using connectors.

Installing and removing contacts.



72 Safety precautions and general information

Notes on safety

- Safety regulations for handling airbag modules, airbag components and pyrotechnical seat belt tensioners
- >
- Notes on scrapping vehicles with gas generators
- >
- Deactivation/activation pyrotechnical components
- >

Handling electrical system and electronics

- Unlocking/locking airbag plug connections
- >
- Repairing airbag lines
- >
- Handling optical fibres
- >

Check

- Check seat belt
- >
- Checklist for seat belt
- >

Airbag system

- Functional description and checking, refer to Diagnosis system
- >
- Deactivating airbags
- >
- Procedure after airbag deployment.
- >

Active pedestrian protection AFGS

- Procedure after actuator triggering
- >



72 00 ... Safety regulations for handling components with gas generators

It is essential to comply with the regulations as specified in the law relating to the use of explosives when working on airbag units and seat belt tensioners.

Airbags, seat belt tensioners etc. are pyrotechnical objects. Pyrotechnical objects are assigned to different danger classes on the basis of the quantity of propellant that they contain. The assignment can be ascertained from the identification marking on the product:

Important!

Failure to comply with the warning notices and repair instructions for gas generator components can cause accidental deployment and result in injury and vehicle damage!

This applies in particular to the following components:

- Airbag modules (driver's/front passenger airbags, side airbags)
- Buckle/belt tensioner
- Head airbag
- Active knee protection
- Active head restraint
- Safety battery terminal

1. Regulations

The regulations quoted in the following refer to the Federal Republic of Germany.

In all other countries, the relevant legislation and regulations must be observed in each case. Country-specific legal regulations that go beyond this information or court decisions based thereon must be followed in each case or given precedence over these regulations.

The following components used by BMW:

- Pyrotechnical restraint systems are subject to danger class PT1
- Gas generators are pyrotechnical objects belonging to danger class T1

Handling, transporting and storing non-fired gas generators are subject to the "Explosive Materials Act" (law relating to the use of explosives dated 13/09/1976).

The relevant trade supervisory authority must be notified at least 2 weeks before pyrotechnical objects are handled for the first time. Here the relevant authority must be notified in writing of the person responsible (e.g. dealership owner, holder of general power of attorney or if necessary workshop supervisor). A certificate of qualification, i.e. specific training, is not required for the person responsible.

2. Dismantling and installation

- Inspection, testing and installation work may only be carried out by expert trained personnel in BMW Service.
- Work on components of the airbag system should only ever be carried out with the battery disconnected, the negative terminal post covered and the plug connection of the cable leading to the gas generator disconnected. If only the battery is disconnected, the following prescribed waiting period must be observed without fail:
 - 30 min. for vehicles up to 9/93
 - 1 min. for vehicles from 9/93 onward
- In the event of breaks in work, a component with a gas generator that has been removed must be secured against access by other persons.
- Individual components must never be repaired. Instead, always replace them.
- Do not treat airbag system components with cleaning agents or grease.
- Components of the airbag system must not be exposed to temperatures in excess of 75 °C.



- Airbag system components, including electronic diagnostic components, which have been dropped from heights in excess of 0.5 m must not be reinstalled in the vehicles.
- Do not remove components of the airbag system from the original packaging until immediately before they are to be installed in the vehicle.
- Before installing, subject components such as housing, connector pins ,etc. of the airbag system (including diagnosis electronics) to a visual inspection for damage and replace if necessary.
- Airbag system components may only be electrically tested while they are installed and only with the BMW ISTA.
- **Danger of injury:** The airbag module may only be set down with the airbag itself facing *upwards*. Otherwise the alternator will be thrown upwards if it is ignited.
- Do not point the ignition squib of a gas generator at other persons.
- Components with gas generators must not be fired while they are removed. They must be disposed of by special disposal companies or returned to BMW in the packaging of the new components.
- When carrying out straightening and welding work with an electric welder:
 - Disconnect battery
 - Cover negative terminal (post)
- Avoid all contact with the skin when removing a fired airbag module - wear gloves. Wash with water after contact with the skin.

3. Transport

- Components with gas generators must be sent off in the packaging of the new components.

4. Storage

- Observe the regulations of the relevant trade supervisory authority and the applicable national regulations.



**Warning!**

Read and comply with safety regulations for handling airbag modules and pyrotechnical belt tensioners.

**Important!**

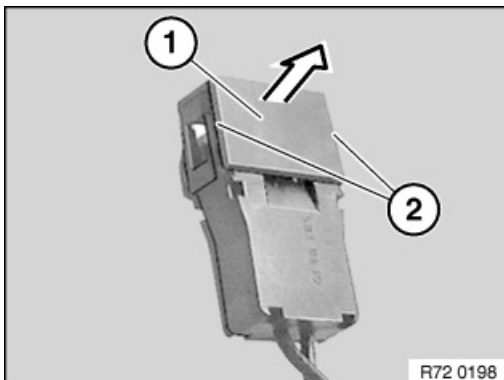
An airbag plug connection must be replaced if it is damaged.

Sourcing reference for airbag repair instructions (with plug connection), refer to BMW Parts Service.



Following versions of plug connections on airbag module/gas generator are possible:

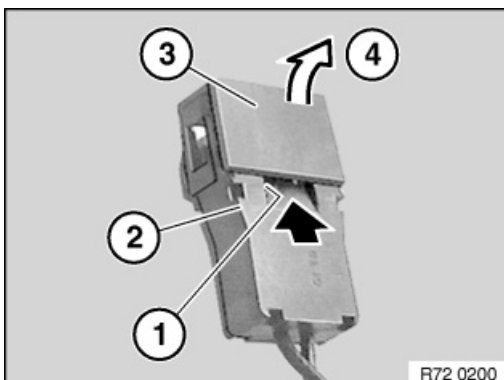
- Airbag plug connection on gas generator/airbag module is offset by 90°
- Airbag plug connection on gas generator/airbag module is straight (3 versions)

**Airbag plug connection on gas generator/airbag module offset by 90°:**

There are two ways of unlocking this airbag plug connection on the gas generator/airbag module:

Method 1:

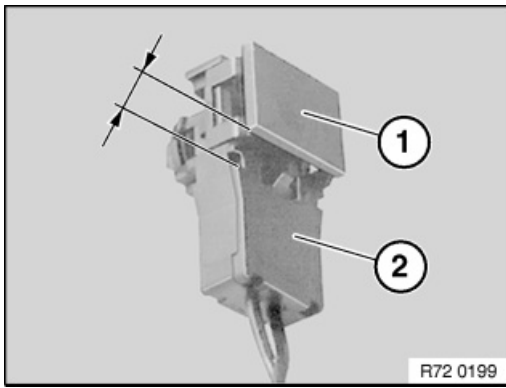
Simultaneously pull cover (1) upwards at lugs on left and right (2).

Method 2:

Insert a narrow screwdriver into recess (1) in housing (2).

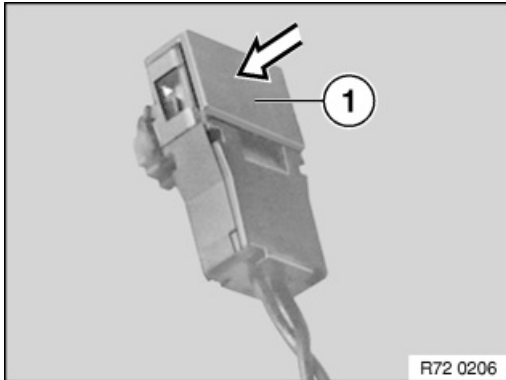
Carefully prise cover (3) off (4).





Cover (1) is not positioned higher than housing (2).

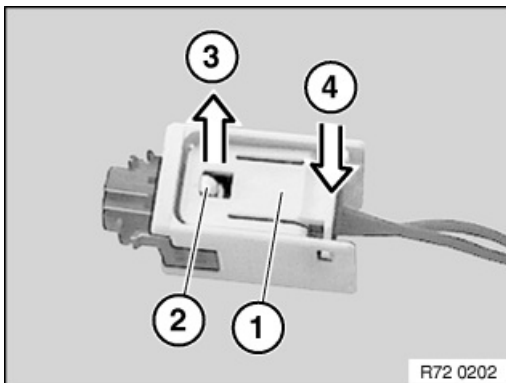
The airbag plug connection is unlocked and can now be detached from the gas generator/airbag module.



Installation:

After attaching airbag plug connection to gas generator/airbag module, press cover (1) downwards until it rests flat on housing.

Check that it catches properly.



Airbag plug connection on gas generator/airbag module is straight (2 versions)

Version 1:

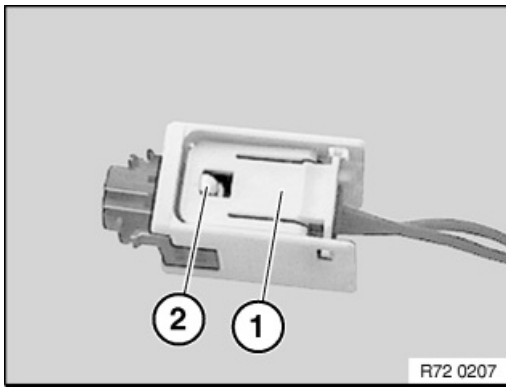
Press locking/unlocking plate (1) at edge (4).

Locking/unlocking plate (1) snaps upwards at opposite edge (3) and releases detent lug (2).



The airbag plug connection is unlocked and can now be detached from the gas generator/airbag module.

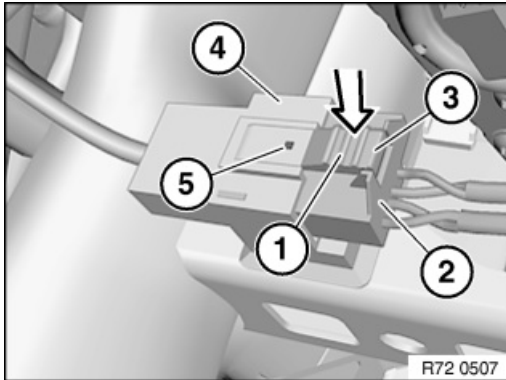




Installation:

After attaching airbag plug connection to gas generator/airbag module, check whether detent lug (2) is visible in opening of locking/unlocking plate (1).

Only if the detent lug (2) is visible will the airbag plug connection gas generator/airbag module be correctly engaged.

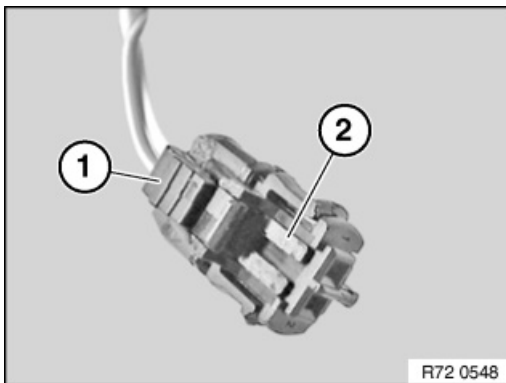


Version 2:

Press locking/unlocking plate (1) on edge (3) and pull plug (2) out of plug housing (4).

Installation:

Only if the detent lug is visible in opening (5) will the gas generator/airbag module plug connection be correctly engaged.



Version 3:

Press lock button (1) and pull out plug (2) up to initial engagement position.

Detach plug (2) from firing pellet.

Installation:

Insert plug connection in initial engagement position in gas generator/airbag module and engage in final engagement position.

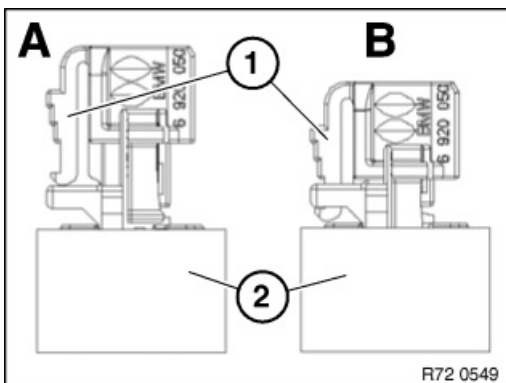
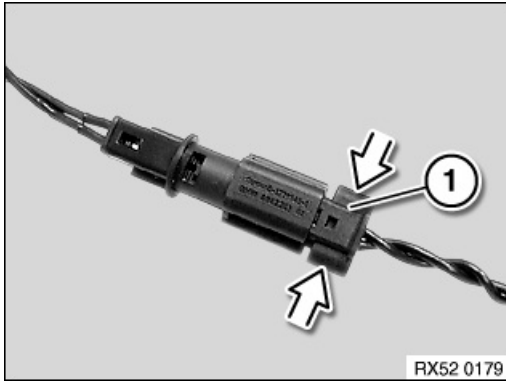


Illustration of version 3 with gas generator:

- A. Initial engagement position
- B. Final engagement position
- 1. Lock button
- 2. Gas generator





Version 4 - Crash-active head restraint:

Press locking clip at edge and disconnect plug (1).

Installation:

Check for correct engagement.





Screw securing adhesive is a means of preventing a screwed connection from being loosened by external influences.

Once the screw has been coated with adhesive, the adhesive remains inactive until such time that it is activated by the encapsulation breaking when the screw is inserted and then cures (hardens) at room temperature.



Installation note:

- Screw connection must be completed within 20 mins. (start of curing)
- Microencapsulated screws must not be retightened
- Thread of nut must be cleaned beforehand in event of repeated use



72 **Safety precautions and general information**

Notes on safety

-- Safety regulations for handling airbag modules, airbag components and
> pyrotechnical seat belt tensioners

-- Notes on scrapping vehicles with gas generators
>

-- Deactivation/activation pyrotechnical components
>

Handling electrical system and electronics

-- Unlocking/locking airbag plug connections
>

-- Repairing airbag lines
>

-- Handling optical fibres
>

Check

-- Check seat belt
>

-- Checklist for seat belt
>

Airbag system

-- Functional description and checking, refer to Diagnosis system
>

-- Deactivating airbags
>

-- Procedure after airbag deployment.
>

Active pedestrian protection AFGS

-- Procedure after actuator triggering
>



**Important!**

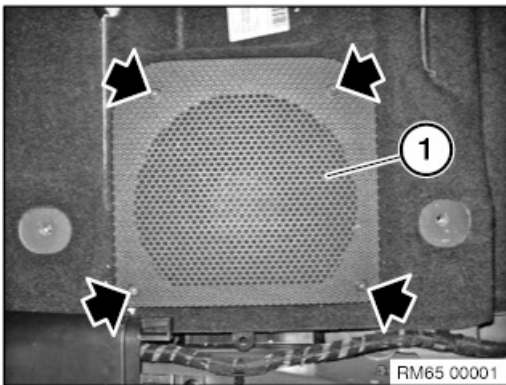
Read and comply with notes on protection against electrostatic discharge (ESD protection).

**Note:**

Comply with notes and notes on handling optical fibres.

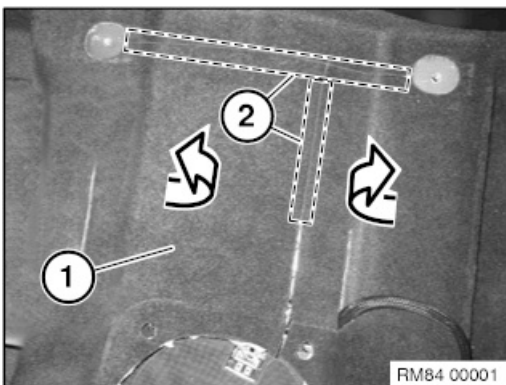
**Necessary preliminary tasks:**

- Remove left front seat



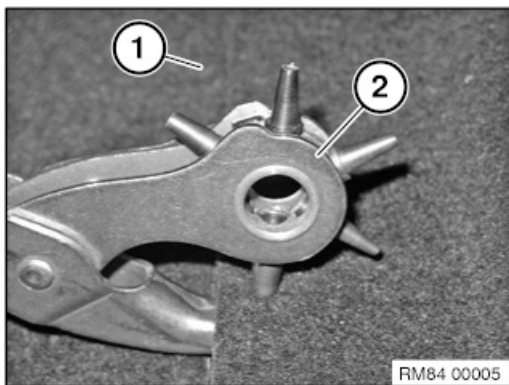
Release screws.

Remove cover (1) upwards.



Cut carpet (1) to size in area (2) and raise up in direction of arrow.

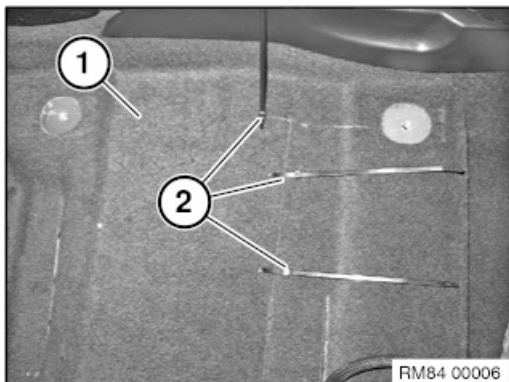




Important!

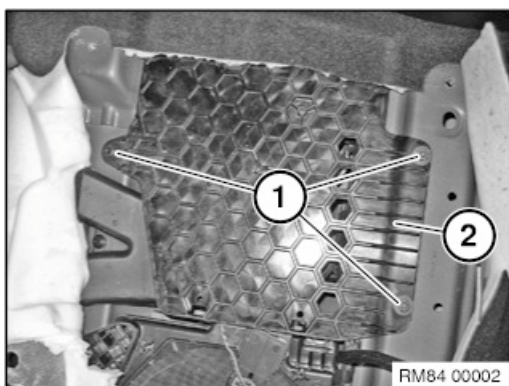
The holes must be opposite from each other!

Punch the carpet (1) with hole punch pliers (2).



Installation note:

Fasten the carpet (1) with cable straps (2).

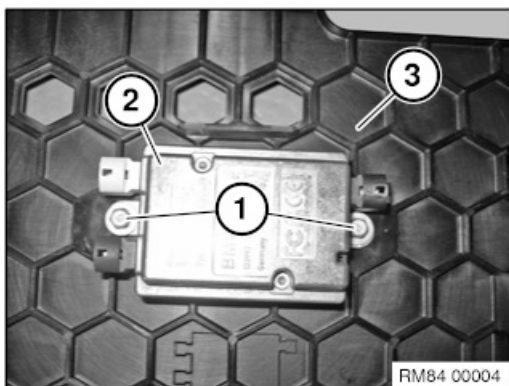


Release screws (1).

Remove holder for hub (2) to the top and unlock and disconnect plug connections located behind it.

Installation note:

Make sure holder for hub (2) is correctly seated.



Release screws (1).

Remove hub (2) from holder (3).

Installation note:

Make sure USB hub (2) is correctly seated.



Replacement:

- Carry out vehicle programming/encoding

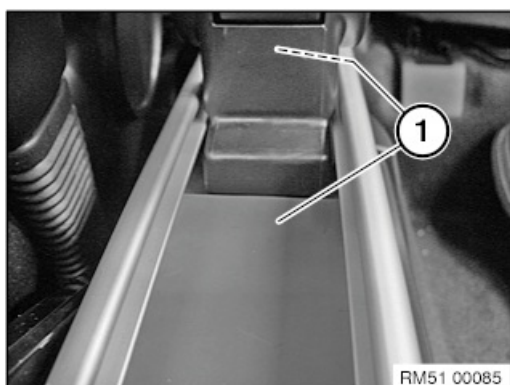


**Special tools required:**

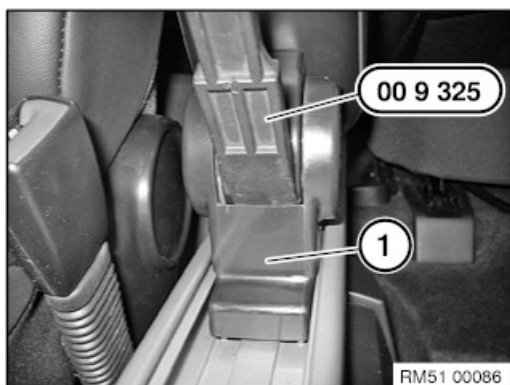
- 00 9 325
- 00 9 327
- 00 9 340

**Important!**

Read and comply with notes on protection against electrostatic discharge (ESD protection).

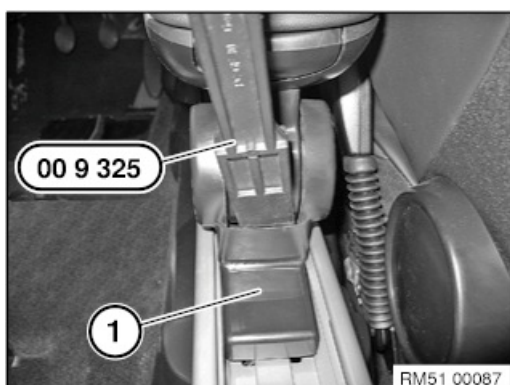


Feed out inserted mat (1) by approx. 5 cm at the front and rear and fold down.



Fold centre armrest up.

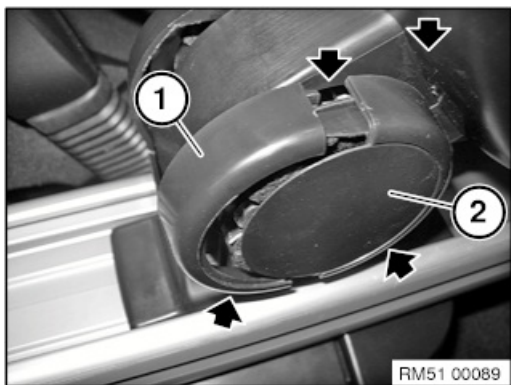
Lever out front shell (1) of cover toward front using special tool 00 9 325 .



Fold centre armrest down.

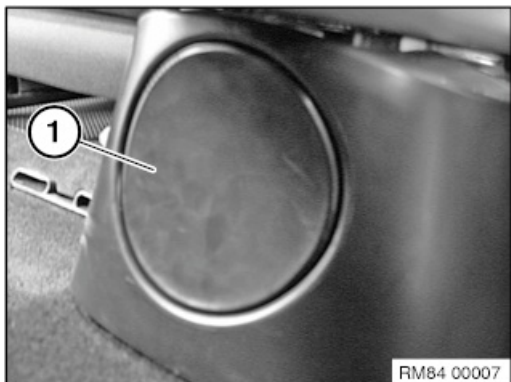
Lever out rear shell (1) of cover toward rear using special tool 00 9 325 .



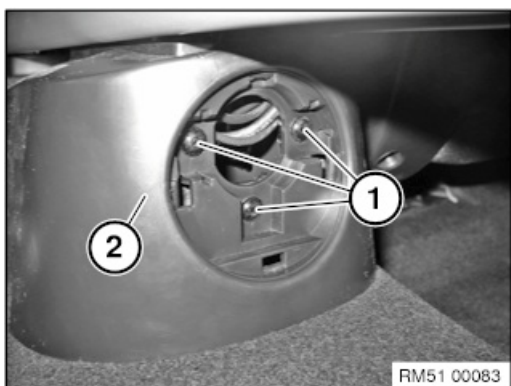


Installation note:

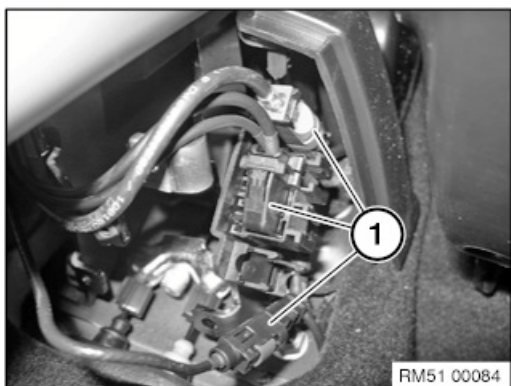
Correctly lock retaining tabs of front (1) and rear (2) shell of cover.



Carefully remove cover from support (1). *Installation note:*
Make sure cover (1) is correctly seated.

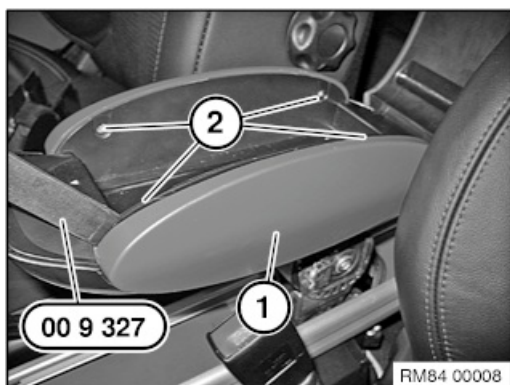


Release screws (1) and remove rear centre console cover rearwards (2).



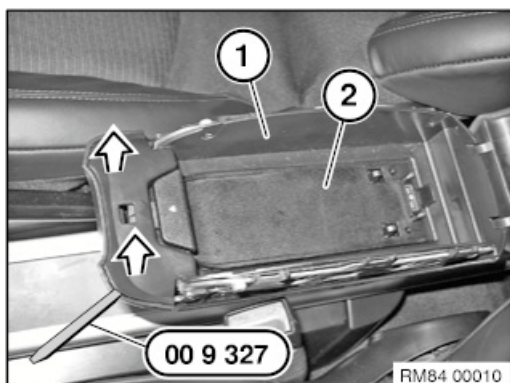
Unlock plug connections (1) and disconnect.





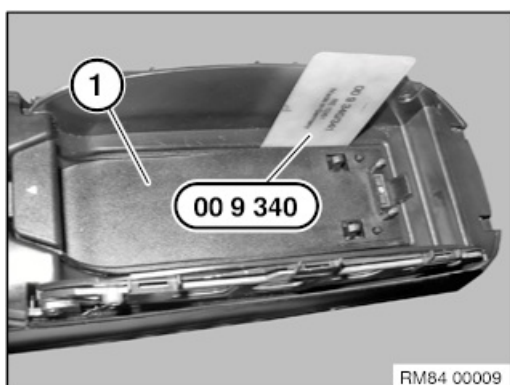
Carefully lever out side cover (1) with special tool 00 9 327

Unfasten screws (2).

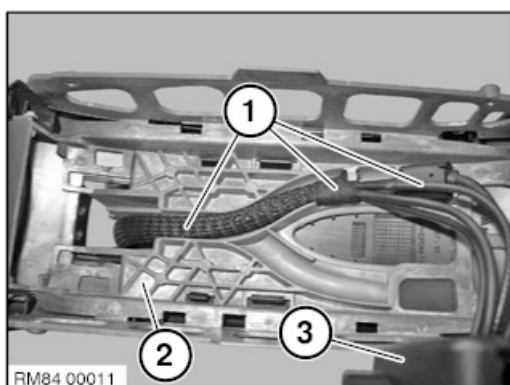


Carefully lever out centre armrest cover, top (1) with special tool 00 9 327

Remove centre armrest cover top (1) with base plate (2) in direction of arrow.



Carefully lever out base plate (1) with special tool 00 9 340



Feed out cable (1) from centre armrest (2).

Remove base plate (3).

Installation note:

Make sure the line routing of cable (1) is correct.



**Important!**

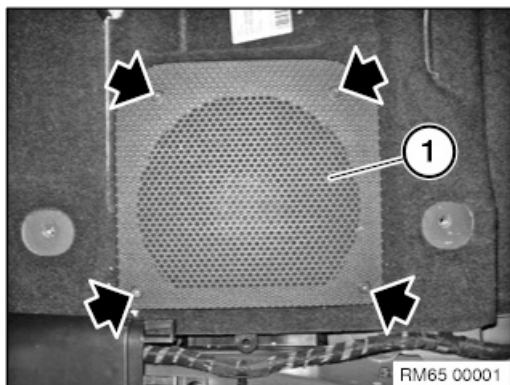
Read and comply with notes on protection against electrostatic discharge (ESD protection).

**Note:**

Comply with notes and notes on handling optical fibres.

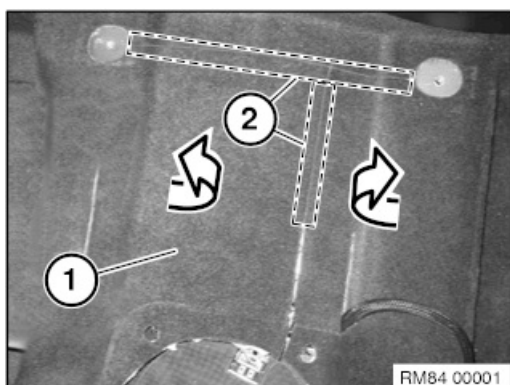
**Necessary preliminary tasks:**

- Remove right front seat



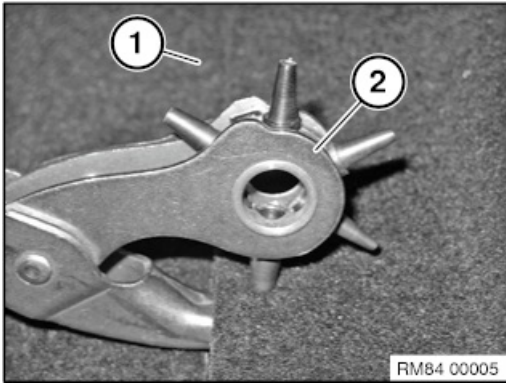
Release screws.

Remove trim (1) upwards.



Cut carpet (1) to size in area (2) and raise up in direction of arrow.

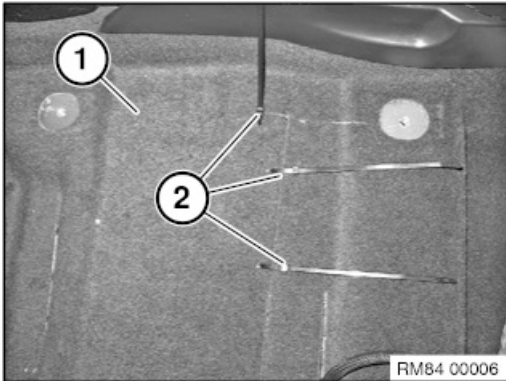




Important!

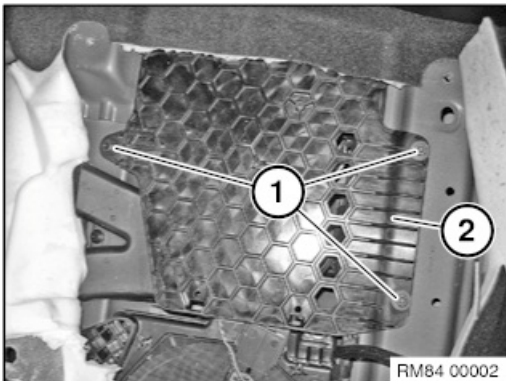
The holes must be opposite from each other!

Punch the carpet (1) with hole punch pliers (2).



Installation note:

Fasten the carpet (1) with cable straps (2).



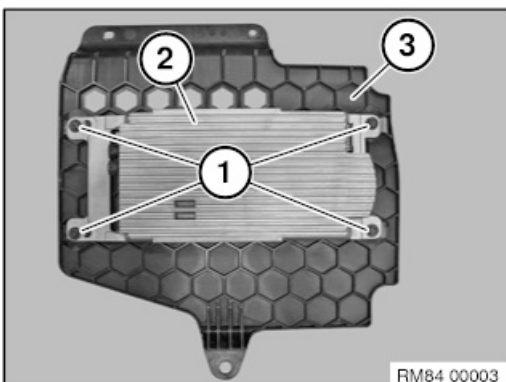
Release screws (1).

Remove the holder for the Combox (2) upwards. Unlock plug connections behind and disconnect.

Installation note:

Observe colour coding of aerial connectors.

Make sure the holder for the Combox (2) is correctly seated.



Release screws (1).

Remove the Combox (2) from the holder (3).

Installation note:

Make sure the Combox (2) is correctly seated.



**Replacement:**

- Carry out vehicle programming/encoding

For vehicles with Teleservices optional equipment:

- Update services via menu in the central information display.

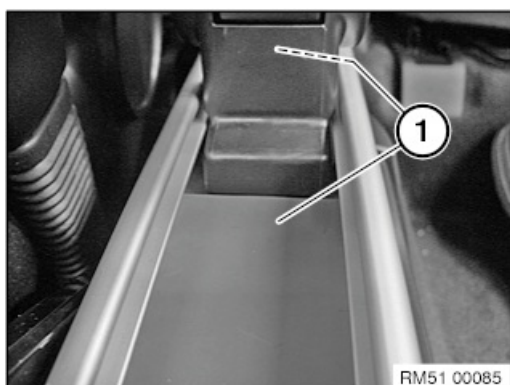


**Special tools required:**

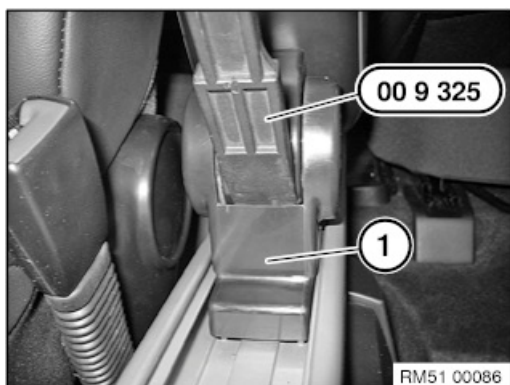
- 00 9 325
- 00 9 327
- 00 9 340

**Important!**

Read and comply with notes on protection against electrostatic discharge (ESD protection).

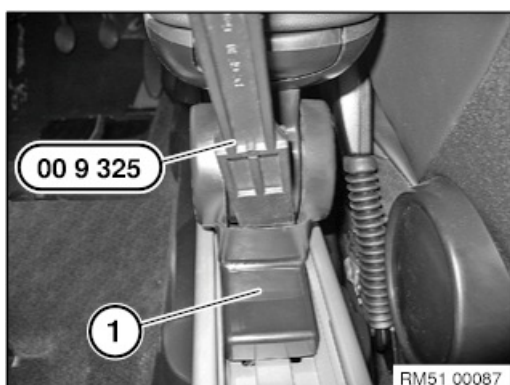


Feed out inserted mat (1) by approx. 5 cm at the front and rear and fold down.



Fold centre armrest up.

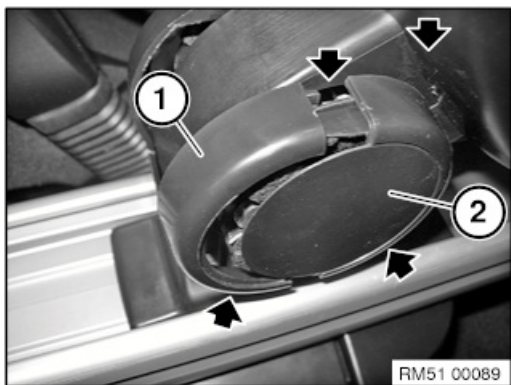
Lever out front shell (1) of cover toward front using special tool 00 9 325 .



Fold centre armrest down.

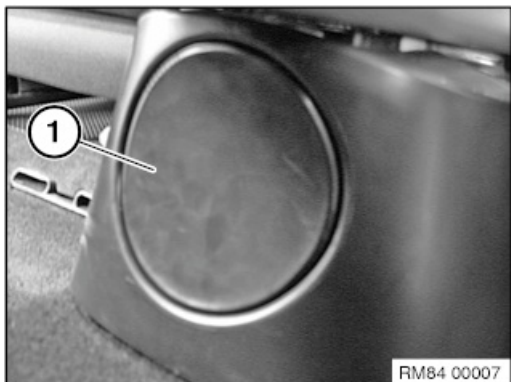
Lever out rear shell (1) of cover toward rear using special tool 00 9 325 .



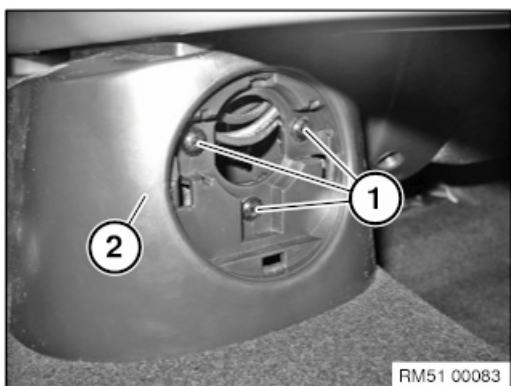


Installation note:

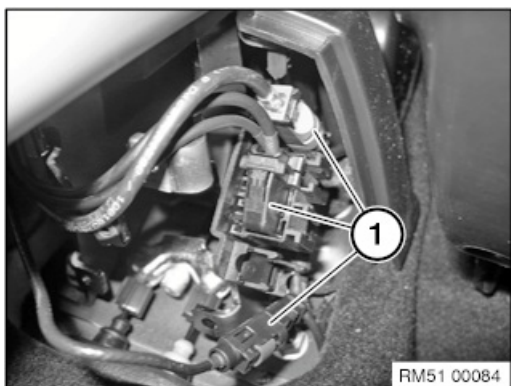
Correctly lock retaining tabs of front (1) and rear (2) shell of cover.



Carefully remove cover from support (1). *Installation note:*
Make sure cover (1) is correctly seated.

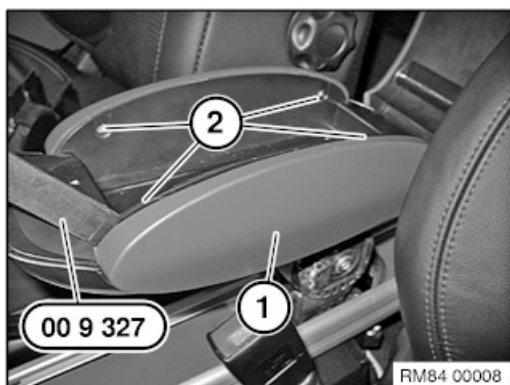


Release screws (1) and remove rear centre console cover rearwards (2).



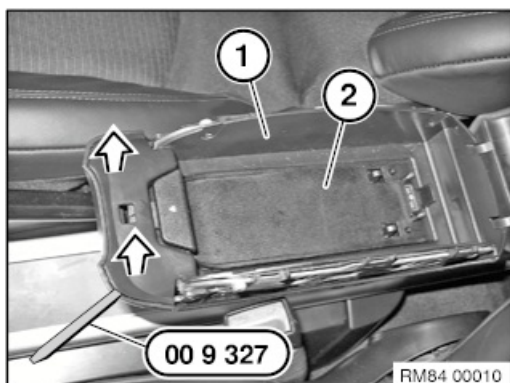
Unlock plug connections (1) and disconnect.





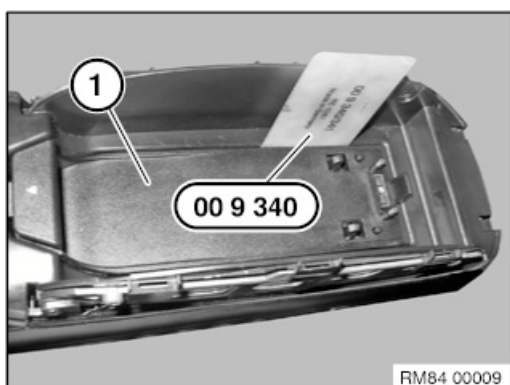
Carefully lever out side cover (1) with special tool 00 9 327

Unfasten screws (2).

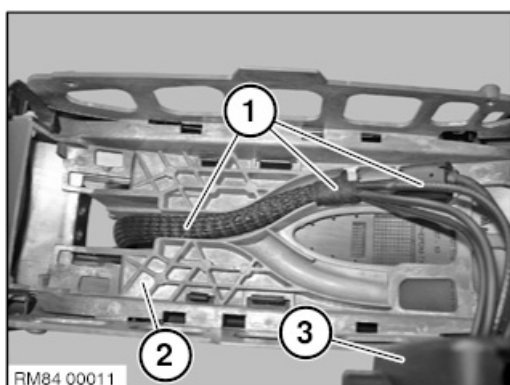


Carefully lever out centre armrest cover, top (1) with special tool 00 9 327

Remove centre armrest cover top (1) with base plate (2) in direction of arrow.



Carefully lever out base plate (1) with special tool 00 9 340



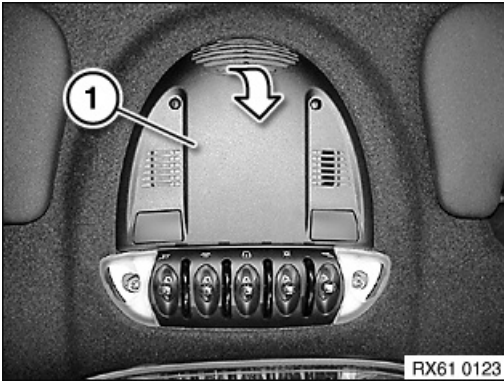
Feed out cable (1) from centre armrest (2).

Remove base plate (3).

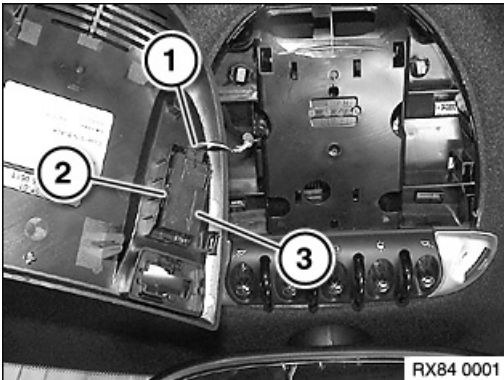
Installation note:

Make sure the line routing of cable (1) is correct.





Lever off cover (1) from interior roof light.



Disconnect plug connection (1).

Unclip microphone (2) from bracket.

Installation note:

Direction arrow (3) must point in direction of travel.



**Important!**

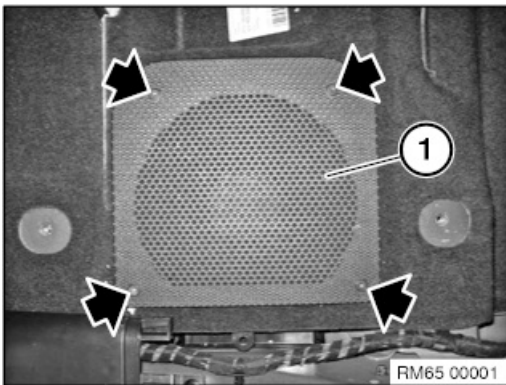
Read and comply with notes on protection against electrostatic discharge (ESD protection).

**Note:**

Comply with notes and notes on handling optical fibres.

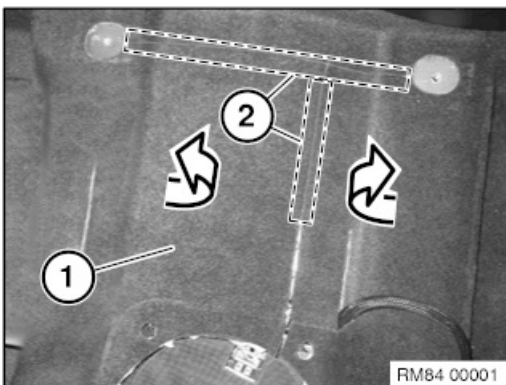
**Necessary preliminary tasks:**

- Remove left front seat



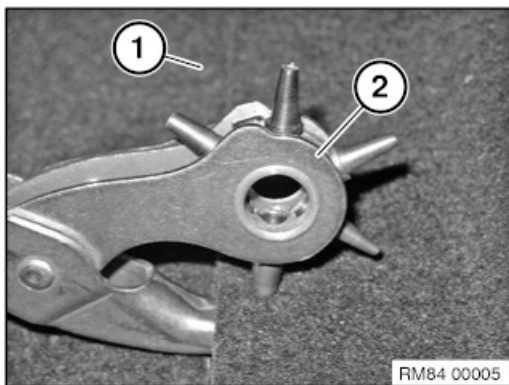
Release screws.

Remove cover (1) upwards.



Cut carpet (1) to size in area (2) and raise up in direction of arrow.

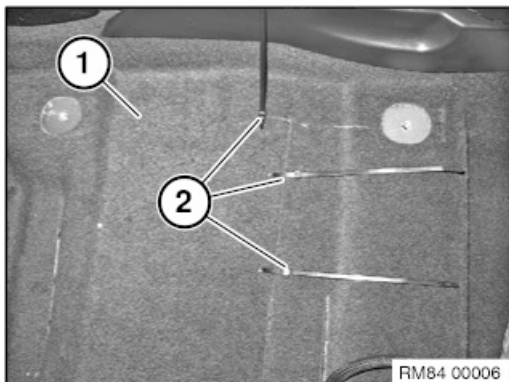




Important!

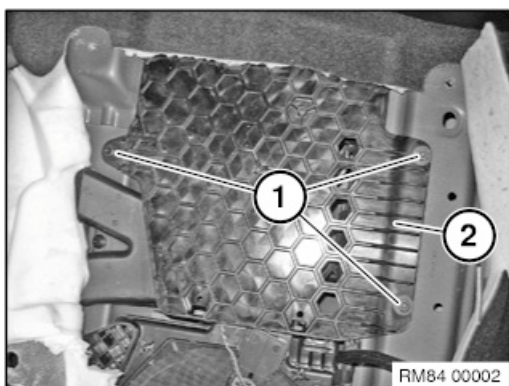
The holes must be opposite from each other!

Punch the carpet (1) with hole punch pliers (2).



Installation note:

Fasten the carpet (1) with cable straps (2).

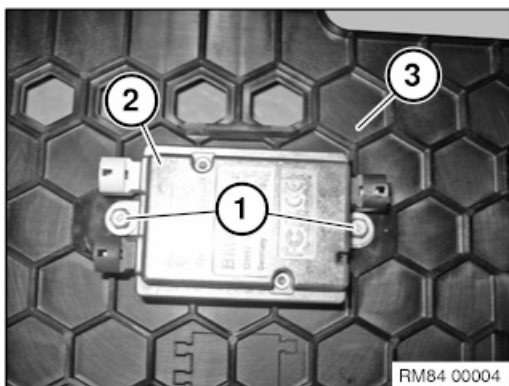


Release screws (1).

Remove holder for hub (2) to the top and unlock and disconnect plug connections located behind it.

Installation note:

Make sure holder for hub (2) is correctly seated.



Release screws (1).

Remove hub (2) from holder (3).

Installation note:

Make sure USB hub (2) is correctly seated.



Replacement:

- Carry out vehicle programming/encoding



**Important!**

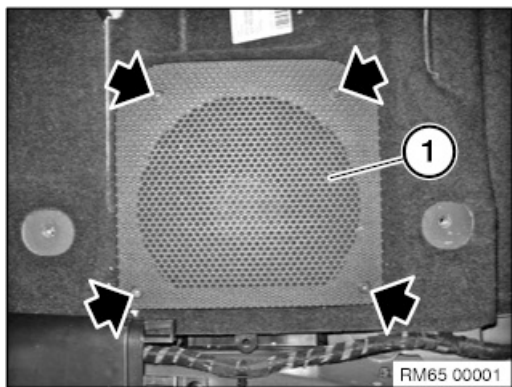
Read and comply with notes on protection against electrostatic discharge (ESD protection).

**Note:**

Comply with notes and notes on handling optical fibres.

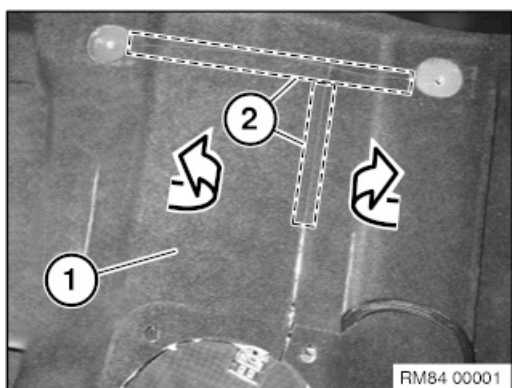
**Necessary preliminary tasks:**

- Remove right front seat



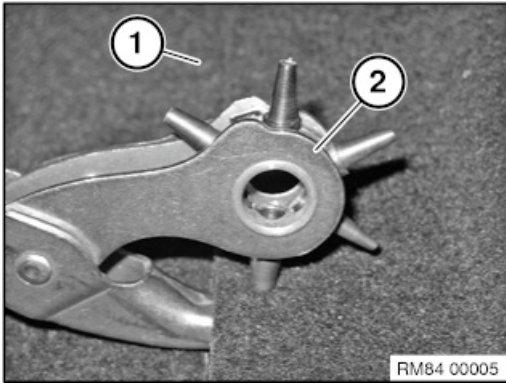
Release screws.

Remove trim (1) upwards.



Cut carpet (1) to size in area (2) and raise up in direction of arrow.

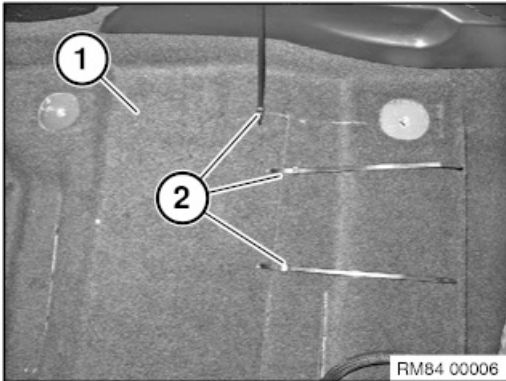




Important!

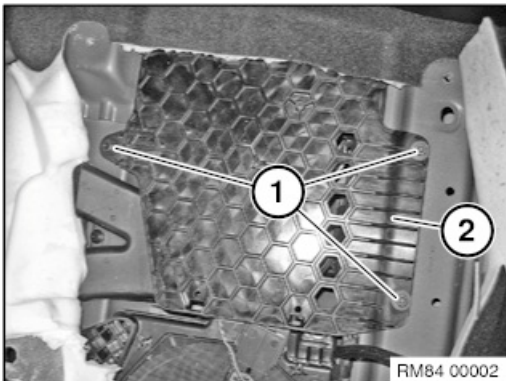
The holes must be opposite from each other!

Punch the carpet (1) with hole punch pliers (2).



Installation note:

Fasten the carpet (1) with cable straps (2).



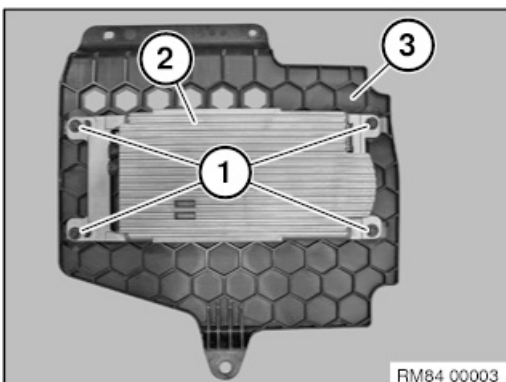
Release screws (1).

Remove the holder for the Combox (2) upwards. Unlock plug connections behind and disconnect.

Installation note:

Observe colour coding of aerial connectors.

Make sure the holder for the Combox (2) is correctly seated.



Release screws (1).

Remove the Combox (2) from the holder (3).

Installation note:

Make sure the Combox (2) is correctly seated.



**Replacement:**

- Carry out vehicle programming/encoding

For vehicles with Teleservices optional equipment:

- Update services via menu in the central information display.



**The following applies in general:**

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies:Shielded lines

Interference radiation and interference resistance can lead to neutral zones at contact points in the shielding. Consequently, distinctions have to be drawn between the following types:

Coaxial lines

- Shielded coaxial cables RTK031 may only be repaired with special crimping tool.
- For aerial lines only the bushing contact may be repaired.
- RG174 Lines and the bushing contact may not be repaired.

CVBS lines

- CVBS cables may not be repaired.
- CVBS cables must be replaced in their entirety.

HSD lines

- HSD cables may not be repaired.
- HSD cables must be replaced in their entirety.

Optical fibre cable:*Note:*

Fibre-optic cables are coloured differently as follows:

- Green = **MOST** (**M**edia **O**riented **S**ystems **T**ransport) optical fibres
- Yellow = **ISIS** (**I**ntelligent **S**afety and **I**ntegration **S**ystem) optical fibres
- Orange=repair fibre-optic cables

Attention!

- Fibre-optic cables are permitted to show only one junction point (bridge), replace fibre-optic cables if necessary
- Smallest permissible bending radius is 25 mm
- Avoid effects of heat $\geq 85^\circ$

Treating cables and optical fibres

FlexRay (twisted cables)

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

Note:

- FlexRay lines may only reveal one separation point (bridge) per cable



- Flexray lines may only reveal one separation point (bridge); renew complete line if necessary.
- If possible, maintain twisted cable after repair.
- After repairs, twist cables as close as possible to the connector/separation point.
- Twisting must be as symmetrical as possible.

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables

Replacing wiring harnesses

Repair wiring harnesses mainly cover the full equipment of the vehicle. If certain optional equipment is not installed in the vehicle, note the following:

- If necessary, secure the remaining connectors.
- If necessary, seal the remaining connectors outside the vehicle interior, for example, with butyl tape in such a way that moisture ingress can be eliminated permanently.

Note:

Repair wiring harnesses can be equipped with an **additional socket housing** (e.g. 30-pin), **which was not provided on the previous vehicle-side wiring harness**. This socket housing also cannot be found in the wiring diagram.

Procedure

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **in the vehicle interior** (in the footwell, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.
- Alternatively, a suitable pin housing can be fitted on the vehicle-side wiring harness and connected to the additional socket housing.

However, this is permitted only if the following conditions are met:

- Carpets must not protrude visibly or become deformed due to the installation of the additional plug connection.
- It must be possible to install the adjacent components (for example, trims, trim panels, etc.) correctly after installing the additional plug connection.
- All the attachment points of the adjacent components (for example, trims, trim panels, etc.) must engage correctly.
- There must be no rattling noise due to the installation of the additional plug connection.
- The additional plug connection must not damage the adjacent components/wiring harnesses, etc..

The separation point between the vehicle-side wiring harness and the repair wiring harness is located **outside the vehicle interior** (in the wheel arch, for example):

- Cut the additional socket housing and connect the lines to the vehicle-side wiring harness using a butt connector.



- **Using the additional socket housing is not permitted with a separation point outside the vehicle interior.**



64 00 ... Information on using cleaning agent/paints (personal protection equipment)



Warning!

Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!

Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!



Important!

Observe following instructions:

- Store cleaning agents/paints only in a secure cabinet.
- Keep cleaning agents/paints away from naked flames and other sources of ignition.
- Protect cleaning agents/paints from high temperatures and direct sunlight.
- Always keep an eye douche on hand, change the water regularly (once a month).



Important!

Observe following instructions before use:

- Manufacturer's instructions (on container/packaging)
- Hazard warnings (on container/packaging)
- Manufacturer's instructions on package insert
- Material safety data sheet of manufacturer
- Product information in EPC
- National market regulations



Important!

Observe following instructions during use:

- Do not eat, drink or smoke while working with these products.
- Avoid direct contact with skin and eyes.
- Wear personal protective clothing/equipment.
- Ensure that all enclosed areas are well ventilated or extract fumes directly.
- Immediately change working clothes soiled with cleaning agent/paint.
- After finishing work, wash your hands and apply protective skin cream.



Important!

Follow hazard warnings and wear personal protection equipment!





First Aid:

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapours ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.



Recycling:

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.



99 00 ... **General instructions on paintwork**

General instructions and classification of paint stages are described on the KSD CD (under Notes, General information on flat rate unit data, Passenger car explanation for FRU specifications for paintwork).

The marked area shows the basis of area calculation for creating the flat rate unit. The marked area does not show the area actually to be painted. If touching up is required, the painter defines the precise position as he sees fit.

Special procedure for matte paintwork:

Matte paintwork cannot be touched up since the painted surface cannot be polished.

For further information, see also the BMW painting handbook and the Aftersales Assistance Portal.



64 00 ... Information on using cleaning agent/paints (personal protection equipment)



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41 00 ... Information/warning labels

Missing or damaged labels (e. g. tyre pressure) must be replaced.

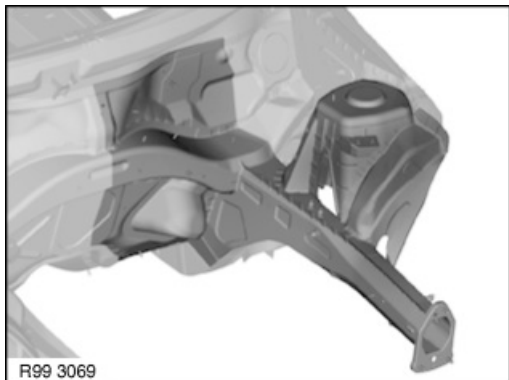
--> overview via the installation location



99 00 ... Interior painting

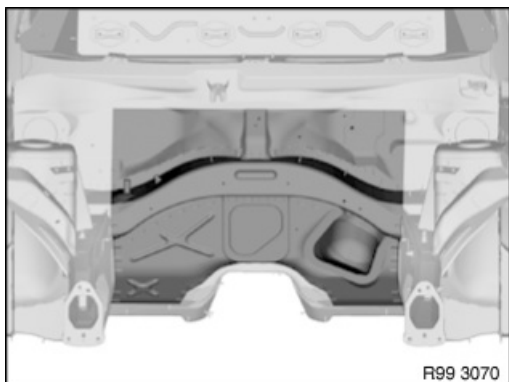


Follow general instructions on painting.

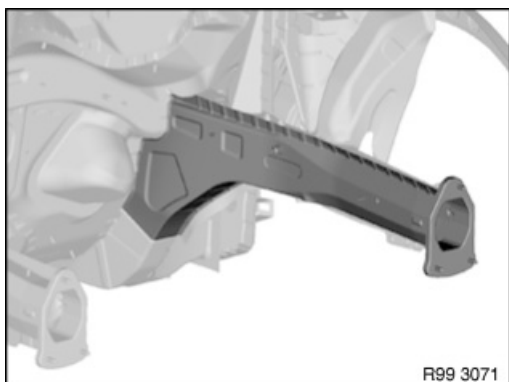


Engine compartment, complete

Carry over the area shown symmetrically to the other side of the car.

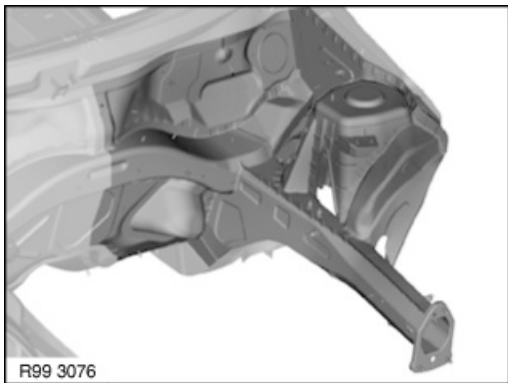


Engine bulkhead



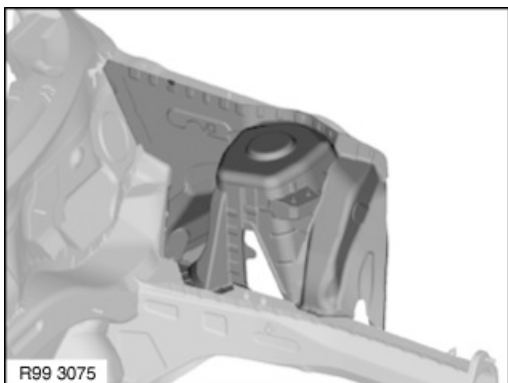
Engine support (inside only)



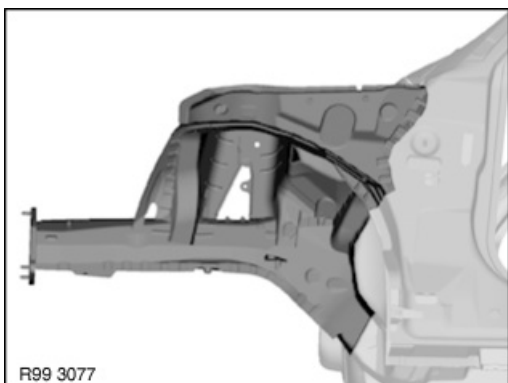


Complete engine support (incl. bulkhead and inner wheel arch section).

Inner side shown



Wheel arch, front (inside only)



Front wheel arch complete (incl. engine support, carrier support and partition wall of units compartment)

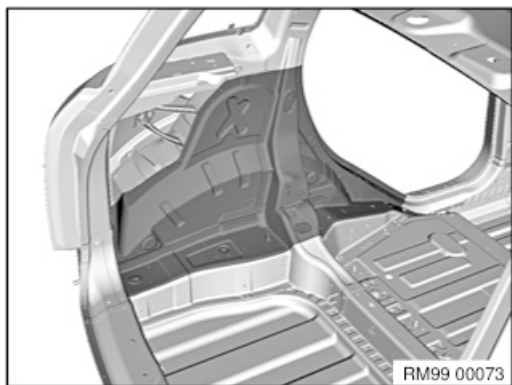
Outer side shown



Luggage compartment floor

Carry over the area shown symmetrically to the other side of the car.





Wheel arch, rear



**Warning!**

Only used a high pressure cleaner approved by BMW!

Only specially trained persons of 16 years of age or older may work with the high pressure cleaner.

Check the high pressure cleaner and electrical wiring for visible damage.

Only use at a suitable location.

**Attention!**

Pay attention to following hazard warnings:

- Danger of injury due to water jet
- Contact with hazardous substances in spray
- Risk of skidding on wet floor
- Risk of stumbling due to hoses and cables
- Comply with notes and instructions on handling cleaning agents !
- Risk of scalding when cleaning with hot water.
- On electric or hybrid cars, the safety instructions for handling with hybrid cars are to be complied with.

**Warning!**

The following personal protective equipment is to be used:

- Safety goggles/face guard
- Suitable gloves
- Apron
- Rubber boots
- Ear protectors
- Safety shoes

**Attention!**

Notes on washing a vehicle with a high pressure cleaner:

- Do not wash directly on gaskets and control units during engine washes.
- A minimum distance of 30 cm must be adhered to for tyres and tyre valves.
- A minimum distance of 30 cm must be adhered to for the soft top and painted parts.
- Do not use if engine is still hot.
- Do not exceed maximum water temperature of 60 degrees.
- Do not spray directly onto cameras/sensors.





Attention!

- For your own safety, we recommend that you do not wash on the high-voltage components in electric or hybrid vehicles.



99 Notes on using temperature-controlled infra-red radiators

When using temperature-controlled infrared radiators, damage to adhesive bonds, paint and vehicle components can occur when drying spatula and filler.

The temperature sensors in the infrared radiator only operate reliably on large, even surfaces.

On small surfaces such as C-pillars or sills, often only a colder, adjacent area is measured.

This leads to actual surface temperatures of up to 130°C, even if only 70°C is set on the infrared radiator.

When the rear side walls are partially replaced by bonding and riveting, these high temperatures can lead to a visible pattern in the area of the joint.

Remedy:

Check the surface temperatures on small component surfaces during the drying process with an external temperature sensor.

The general rule is: The surface temperatures must not exceed 85°C.

Important!

Do not use infrared radiators on carbon parts!

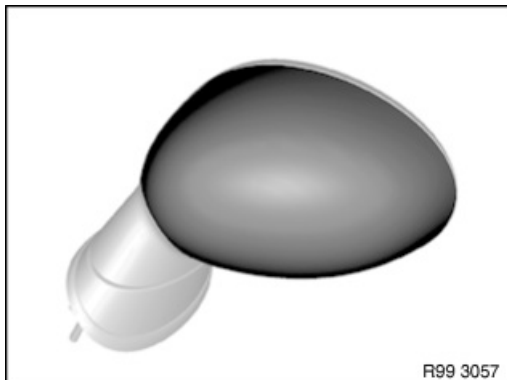
Risk of component destruction.



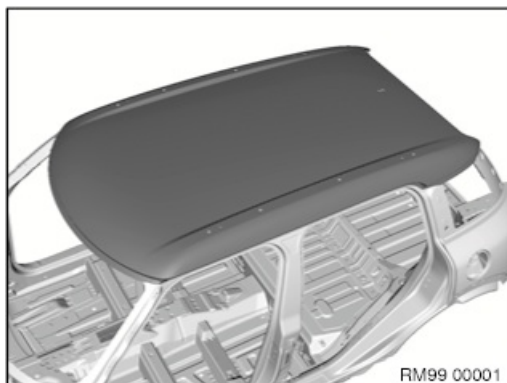
99 00 ... Paintwork (2 and 3 coats)



Follow general instructions on painting.



Inside mirror



Roof

Area specification applies to all paint stages.



Tail panel

Area specification applies to all paint stages.





Side wall, front

Area specification applies to all paint stages.



Front door

Area specification applies to paint stage 1.



Front door

Area specification applies to all paint stages.



Front door

Additional area specification inner panel for paint stages 2 and 3.





Rear door

Area specification applies to paint stage 1.



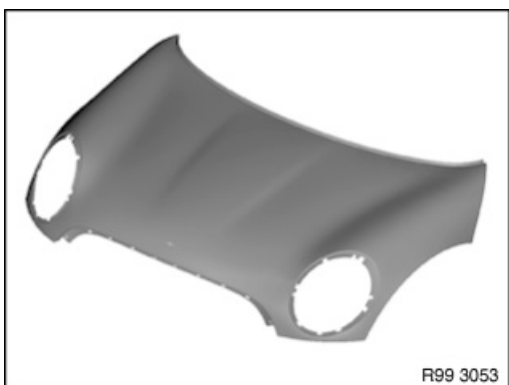
Rear door

Area specification applies to paint stages 2 and 3.



Rear door

Additional area specification inner panel for paint stages 2 and 3.



Engine compartment lid

Area specification applies to all paint stages.

Additionally complete inner panel for paint stages 2 and 3.





Tailgate

Area specification applies to paint stage 1.



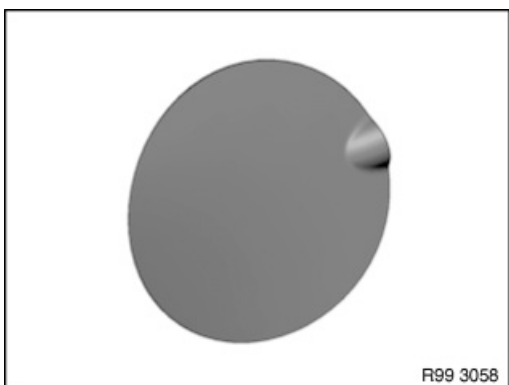
Tailgate

Area specification applies to paint stages 2 and 3.



Tailgate

Additional area specification inner panel for paint stages 2 and 3.



Flap for fuel filler neck

Area specification applies to all paint stages.

Additionally with inner surface for paint stage 2.





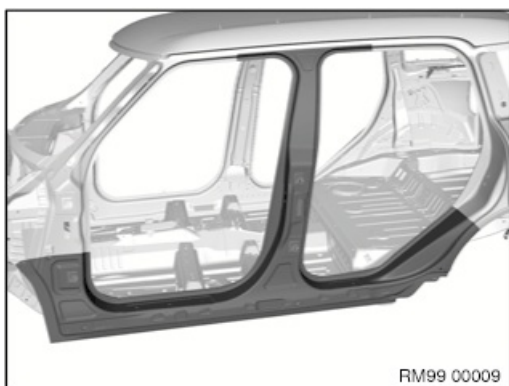
Front Bumper

Area specification applies to all paint stages.



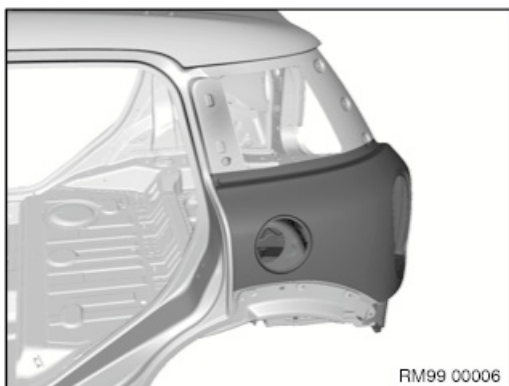
Rear bumper

Area specification applies to all paint stages.



Door post, middle

Area specification applies to all paint stages.



Rear side panel

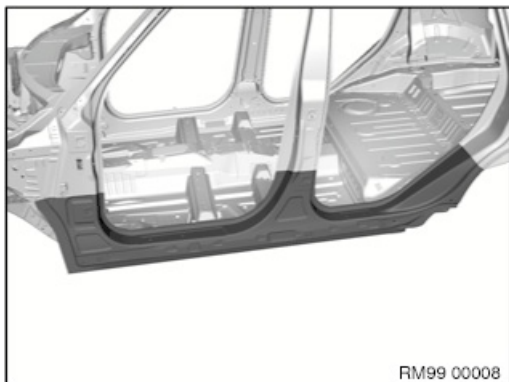
Area specification applies to paint stage 1.





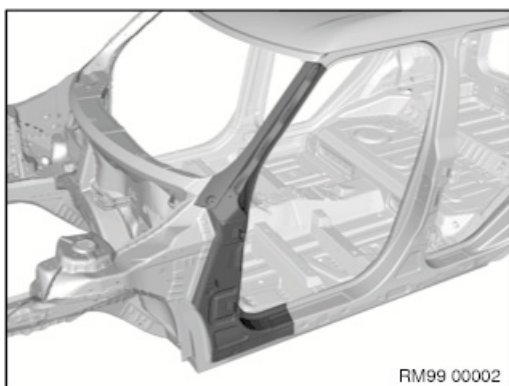
Rear side panel

Area specification applies to paint stages 2 and 3.



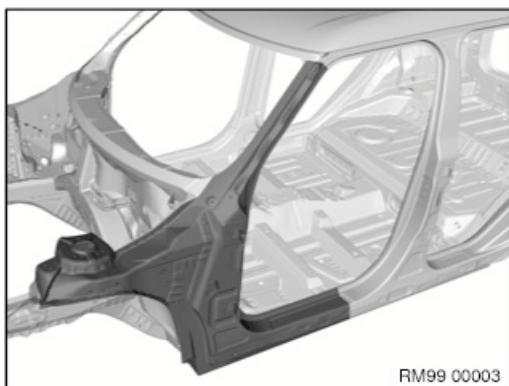
Cover for entrance

Area specification applies to all paint stages.



Door post, front

Area specification applies to paint stage 1.



Door post, front

Area specification applies to paint stages 2 and 3.



99 00 ... Touching up paintwork damage

These notes apply to paintwork damage on the body aperture that occurred when detaching bonded window glass.

To ensure long-term corrosion protection, it is absolutely essential to touch up damage to paintwork!

The "BMW Color System" painting handbook forms the basis of these repair instructions and must be observed without fail.

Ground down damage to paintwork on body aperture and touch up with BMW multibase filler.

Grind larger areas or damage down to the bare sheet metal and coat with BMW multibase filler (layer thickness 30 to 40 µm).

Hardening time:

- With infrared, at least 10 minutes
- Without infrared for at least 60 °C, at least 30 minutes
- Without infrared for at least 20 °C, at least 24 hours

If a complete build-up of paint is required in the visible area:

- Tape off primed adhesive flange before applying top coat

Important!

Observe hardening time of BMW multibase filler otherwise a perfect bond cannot be guaranteed!



99 00 ... **General instructions on paintwork**

General instructions and classification of paint stages are described on the KSD CD (under Notes, General information on flat rate unit data, Passenger car explanation for FRU specifications for paintwork).

The marked area shows the basis of area calculation for creating the flat rate unit. The marked area does not show the area actually to be painted. If touching up is required, the painter defines the precise position as he sees fit.

Special procedure for matte paintwork:

Matte paintwork cannot be touched up since the painted surface cannot be polished.

For further information, see also the BMW painting handbook and the Aftersales Assistance Portal.



64 00 ... Information on using cleaning agent/paints (personal protection equipment)



Warning!

Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!

Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!



Important!

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- Keep cleaning agents/paints away from naked flames and other sources of ignition.
- Protect cleaning agents/paints from high temperatures and direct sunlight.
- Always keep an eye douche on hand, change the water regularly (once a month).



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- Product information in EPC
- National market regulations



Important!

Observe following instructions during use:

- Do not eat, drink or smoke while working with these products.
- Avoid direct contact with skin and eyes.
- Wear personal protective clothing/equipment.
- Ensure that all enclosed areas are well ventilated or extract fumes directly.
- Immediately change working clothes soiled with cleaning agent/paint.
- After finishing work, wash your hands and apply protective skin cream.



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First Aid:

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- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapours ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.



Recycling:

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.



41 00 ... Information/warning labels

Missing or damaged labels (e. g. tyre pressure) must be replaced.

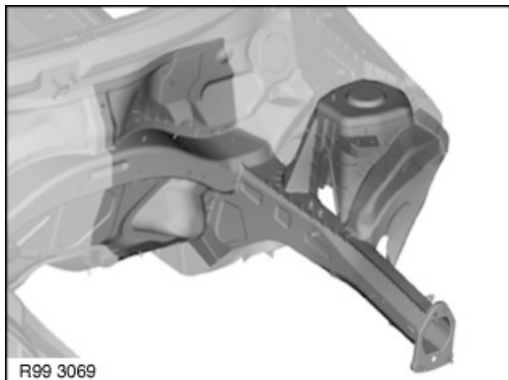
--> overview via the installation location



99 00 ... Interior painting

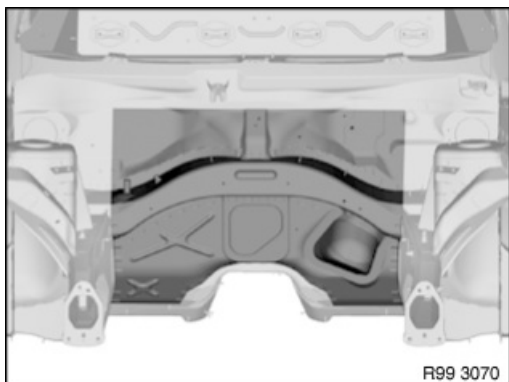


Follow general instructions on painting.

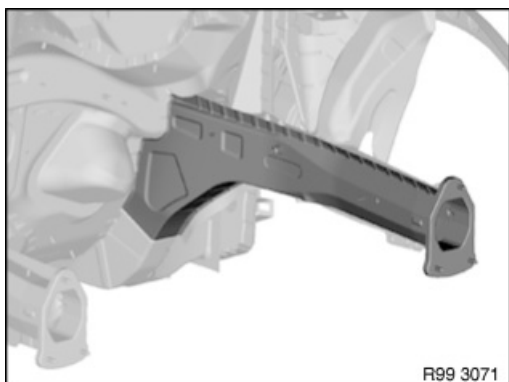


Engine compartment, complete

Carry over the area shown symmetrically to the other side of the car.

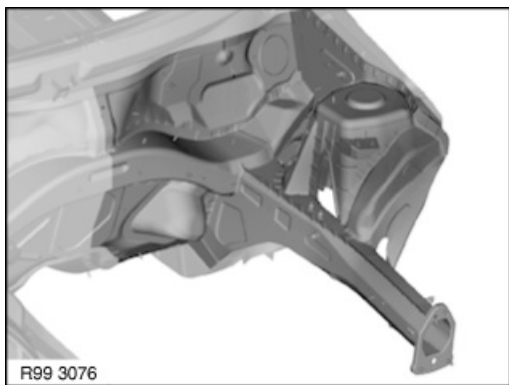


Engine bulkhead



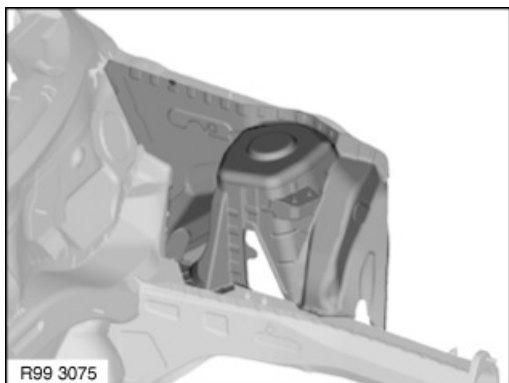
Engine support (inside only)



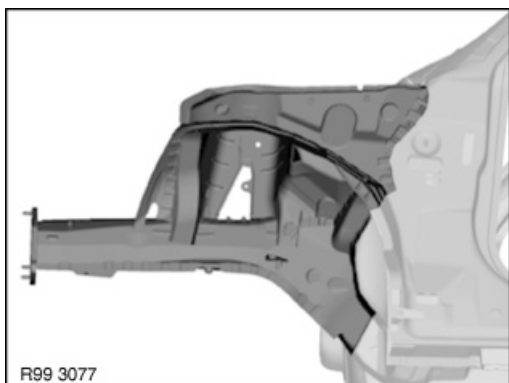


Complete engine support (incl. bulkhead and inner wheel arch section).

Inner side shown



Wheel arch, front (inside only)



Front wheel arch complete (incl. engine support, carrier support and partition wall of units compartment)

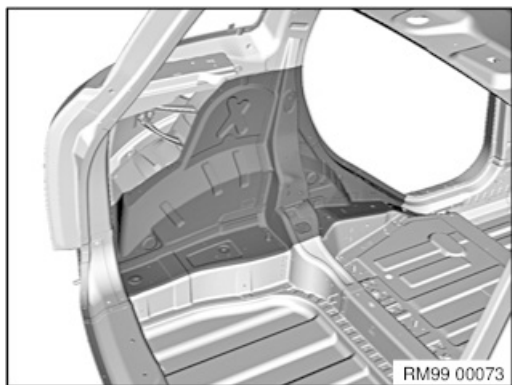
Outer side shown



Luggage compartment floor

Carry over the area shown symmetrically to the other side of the car.





Wheel arch, rear



**Warning!**

Only used a high pressure cleaner approved by BMW!

Only specially trained persons of 16 years of age or older may work with the high pressure cleaner.

Check the high pressure cleaner and electrical wiring for visible damage.

Only use at a suitable location.

**Attention!**

Pay attention to following hazard warnings:

- Danger of injury due to water jet
- Contact with hazardous substances in spray
- Risk of skidding on wet floor
- Risk of stumbling due to hoses and cables
- Comply with notes and instructions on handling cleaning agents !
- Risk of scalding when cleaning with hot water.
- On electric or hybrid cars, the safety instructions for handling with hybrid cars are to be complied with.

**Warning!**

The following personal protective equipment is to be used:

- Safety goggles/face guard
- Suitable gloves
- Apron
- Rubber boots
- Ear protectors
- Safety shoes

**Attention!**

Notes on washing a vehicle with a high pressure cleaner:

- Do not wash directly on gaskets and control units during engine washes.
- A minimum distance of 30 cm must be adhered to for tyres and tyre valves.
- A minimum distance of 30 cm must be adhered to for the soft top and painted parts.
- Do not use if engine is still hot.
- Do not exceed maximum water temperature of 60 degrees.
- Do not spray directly onto cameras/sensors.





Attention!

- For your own safety, we recommend that you do not wash on the high-voltage components in electric or hybrid vehicles.



99 Notes on using temperature-controlled infra-red radiators

When using temperature-controlled infrared radiators, damage to adhesive bonds, paint and vehicle components can occur when drying spatula and filler.

The temperature sensors in the infrared radiator only operate reliably on large, even surfaces.

On small surfaces such as C-pillars or sills, often only a colder, adjacent area is measured.

This leads to actual surface temperatures of up to 130°C, even if only 70°C is set on the infrared radiator.

When the rear side walls are partially replaced by bonding and riveting, these high temperatures can lead to a visible pattern in the area of the joint.

Remedy:

Check the surface temperatures on small component surfaces during the drying process with an external temperature sensor.

The general rule is: The surface temperatures must not exceed 85°C.

Important!

Do not use infrared radiators on carbon parts!

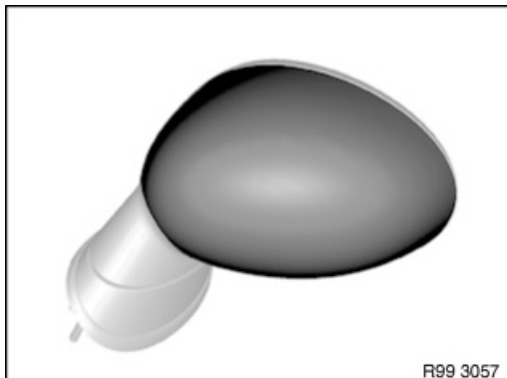
Risk of component destruction.



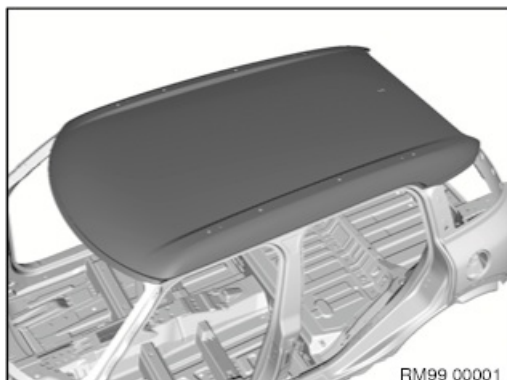
99 00 ... Paintwork (2 and 3 coats)



Follow general instructions on painting.

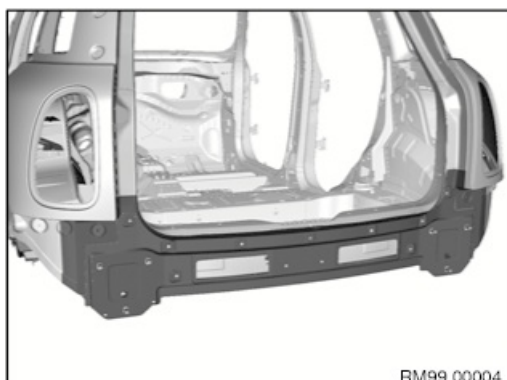


Inside mirror



Roof

Area specification applies to all paint stages.



Tail panel

Area specification applies to all paint stages.





Side wall, front

Area specification applies to all paint stages.



Front door

Area specification applies to paint stage 1.



Front door

Area specification applies to all paint stages.



Front door

Additional area specification inner panel for paint stages 2 and 3.





Rear door

Area specification applies to paint stage 1.



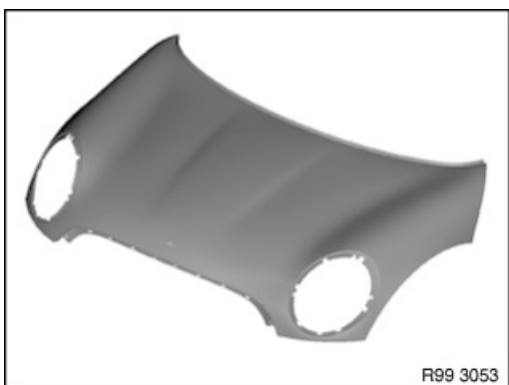
Rear door

Area specification applies to paint stages 2 and 3.



Rear door

Additional area specification inner panel for paint stages 2 and 3.



Engine compartment lid

Area specification applies to all paint stages.

Additionally complete inner panel for paint stages 2 and 3.





Tailgate

Area specification applies to paint stage 1.



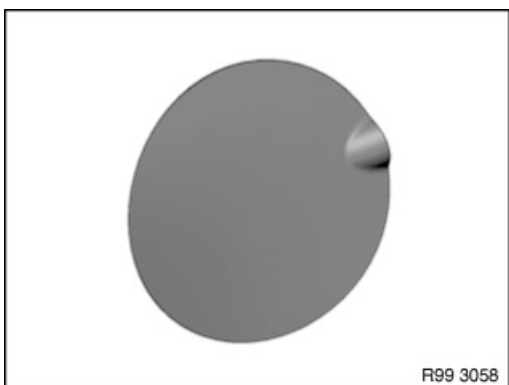
Tailgate

Area specification applies to paint stages 2 and 3.



Tailgate

Additional area specification inner panel for paint stages 2 and 3.



Flap for fuel filler neck

Area specification applies to all paint stages.

Additionally with inner surface for paint stage 2.





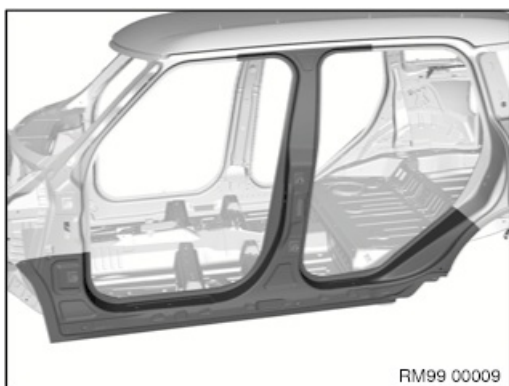
Front Bumper

Area specification applies to all paint stages.



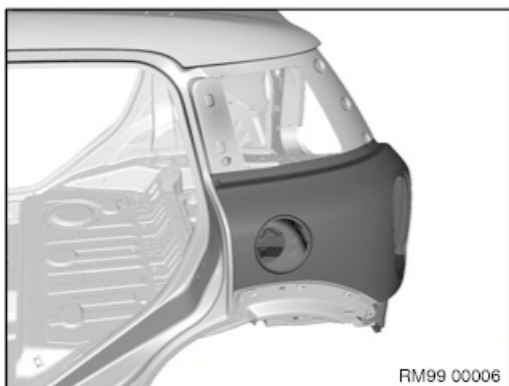
Rear bumper

Area specification applies to all paint stages.



Door post, middle

Area specification applies to all paint stages.



Rear side panel

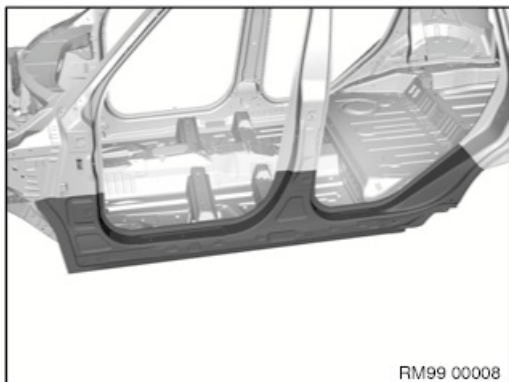
Area specification applies to paint stage 1.





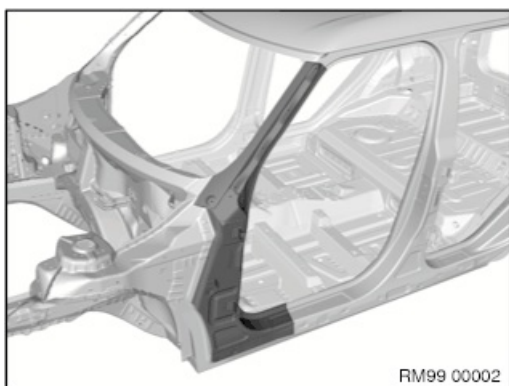
Rear side panel

Area specification applies to paint stages 2 and 3.



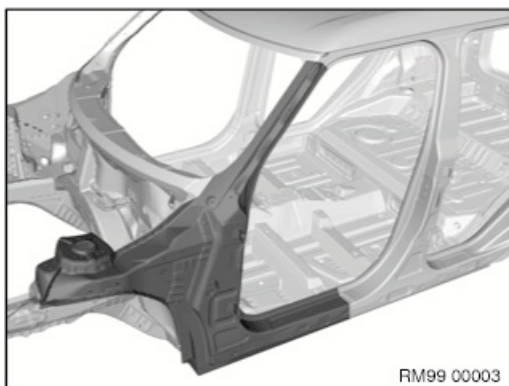
Cover for entrance

Area specification applies to all paint stages.



Door post, front

Area specification applies to paint stage 1.



Door post, front

Area specification applies to paint stages 2 and 3.



99 00 ... Touching up paintwork damage

These notes apply to paintwork damage on the body aperture that occurred when detaching bonded window glass.

To ensure long-term corrosion protection, it is absolutely essential to touch up damage to paintwork!

The "BMW Color System" painting handbook forms the basis of these repair instructions and must be observed without fail.

Ground down damage to paintwork on body aperture and touch up with BMW multibase filler.

Grind larger areas or damage down to the bare sheet metal and coat with BMW multibase filler (layer thickness 30 to 40 µm).

Hardening time:

- With infrared, at least 10 minutes
- Without infrared for at least 60 °C, at least 30 minutes
- Without infrared for at least 20 °C, at least 24 hours

If a complete build-up of paint is required in the visible area:

- Tape off primed adhesive flange before applying top coat

Important!

Observe hardening time of BMW multibase filler otherwise a perfect bond cannot be guaranteed!



00 26 11 (731)

Brake fluid - Operating Fluids Specification

Situation: To provide permanent surface protection in the brake system, only low viscosity DOT4 brake fluids that have been approved by BMW may be used.

Vehicles concerned: All BMW, MINI and Rolls-Royce.

Procedure: The low viscosity DOT4 brake fluids currently approved by BMW can be viewed in the current ISTA version (operating materials - main group 34).



00 12 11 (696)

Brake fluid service - extension of the first brake fluid interval to 36 months

Without US

Situation: Beginning with production date 03/2011, the 1st brake fluid interval is being extended from 24 months to 36 months in all current vehicle types. After the first brake fluid renewal, an interval of 24 months each applies.

New vehicle series introductions are already equipped with the extended 1st brake fluid interval (36 months).

Vehicles concerned:from 03/2011

- MINI R55, R56, R57 and R60
- BMW 1 Series E81, E82, E87 and E88
- BMW 3 Series E90, E91, E92 and E93
- BMW X1 E84
- BMW Z4 E89

from 04/2011

- BMW X5 E70, E71 and E72

from 07/2011

- BMW 6 Series F12 and F13

from 09/2011

- BMW 7 Series F01, F02, F03 and F04
- BMW 5 Series GT F07
- BMW 5 Series F10 and F11
- Rolls-Royce RR4

from 10/2011

- BMW X3 F25
- BMW 5-Series F18

Procedure: The maintenance work must be carried out as shown in the Commercial Service Data and ISTA.



00 06 10 (642)

Brake fluid service – "Bonnet gas strut" check with active pedestrian impact mitigation (SA8TF)

excluding US vehicles

Situation: Thanks to the introduction of the technically enhanced generation of the pedestrian protection as of 03/2011, safety-related components are being installed in the vehicle. To reliably guarantee fulfilment of safety requirements in the long term, specific components have to be replaced regularly. The regular check and/or replacement of these components is carried out in the context of a maintenance visit.

In vehicles prior to the version (build date) specified no check is required or the gas pressure springs have to be replaced.

Vehicles concerned: All vehicles with active pedestrian protection (SA8TF)

Measure: **Attention!**

Expiry date present on gas pressure spring for bonnet:

Check the expiry date of the engine compartment lid gas pressure springs (1) at every brake fluid renewal. The expiry date of the two engine compartment lid gas pressure springs (1) must extend to the time of the next brake fluid service (24 months). If the expiry is before that date, both engine compartment lid gas pressure springs (1) have to be replaced at extra charge.



Attention!

If no expiry date is present on gas pressure spring for bonnet:

The imprint of the expiry date on the gas pressure springs is no longer present in all models. For vehicles with the SA8TF "Active pedestrian protection", still a regular replacement of the gas pressure springs is necessary as part of the maintenance!

For vehicles with the SA8TF "Active pedestrian protection", front compartment lid gas pressure springs are to be renewed starting from the production date of the vehicle in the interval of 5 years at the latest.

=> Renew both front compartment lid gas pressure springs for each second service of brake fluid (approx. 4 to 5 years).

Procedure: The procedure for replacing the front compartment lid gas pressure springs can be found in the repair instructions on ISTA.



00 17 17 (475)

CBS general - Reset is lost

Situation: Field feedback has shown that a CBS reset carried out on the vehicle can be lost.

The fault occurred under the following conditions:

- When the vehicle goes into sleep mode there is an undervoltage
- Vehicle is programmed directly after CBS reset without going into sleep mode

Vehicles concerned:All

Procedure: Avoid the conditions specified above.



00 47 14 (138)

Engine oil - varying colours/ smell after initial filling in the works

Situation: In engine works a few engines are subject to a hot test. To be able to detect possible oil leakages, fluorescent agent is mixed with the engine oil. This agent causes discolouration of the engine oil. Depending on the mixture ratio the engine oil can take a red colour or green/yellow colour and smell like automatic transmission fluid.

The addition of fluorescent agent has **no** impact on the consistency and the characteristics of the engine oil.

Since only engine oil may be kept exclusively in the engine works, a false filling cannot be possible from the technical side.

Vehicles concerned: BMW, MINI and Rolls-Royce

Procedure: The fluorescent agent remains in the engine and is washed out during the first engine oil change.

An engine oil change in connection with the above mentioned complaint is not allowed!



00 38 11 (768)

Engine oil level check - customer recommendation

Situation: A correct engine oil level and the right engine oil quality are a precondition for avoiding engine damage.

Note:

Engine oil consumption depends on the driving style and the conditions of use.

Vehicles concerned: MINI R55, R56, R57, R58, R59, R60

All BMW vehicles with engine N13

Procedure: Make customers aware during every service appointment of the importance of checking the engine oil level regularly. The check is performed using the oil dipstick for engine oil in the engine compartment.

Important!

On the engine oil qualities that have been approved by BMW should be used.

The vehicle-specific Owner's Handbook contains the right procedure for checking the engine oil and the approved oil types.



00 15 16 (388)

Engine oil service - countries with higher levels of dust: Check the air filter element for contamination

Situation: To guarantee the customer's mobility, in countries with higher levels of dust the air filter element should be checked for contamination at each engine oil service.

Vehicles concerned: BMW

MINI

Rolls-Royce

Procedure: In countries with higher levels of dust:

Check the air filter element (intake silencer) for contamination at each engine oil service.

If there is significant contamination, the change interval must be accordingly reduced.



00 30 11 (735)

Final drive oil - new oil quality from 07/2011

Situation: In motor vehicles from production date 07/2011, the final drive oil SAF-XO is being replaced by the final drive oil Hypoid Axle Oil G1 (BOT448).

Vehicles concerned: All BMW without M models

All MINI

All Rolls-Royce

Procedure: In vehicles from production date 07/2011, use oil specification Hypoid Axle Oil G1 (BOT448) for oil filling/additions to the rear axle differential.

The final drive oils currently approved by BMW can be viewed in the current ISTA version (operating materials - main group 33).



Handling fault messages / Check Control messages for Run Flat Indicator RDC (SA2VB)

Situation: Since 2014 the standard equipment of all new vehicles covers a tyre pressure display RDC (SA2VB) for each individual wheel. Sensors on all four wheels enable a precise and individual monitoring of the tyre pressure. In case of a pressure deviation, the driver is notified early. In order to not unsettle customers, three levels were created for the KOMBI messages. These appear as follows:



First level of message:

The first level is only information for the customer, that the tyre pressure has dropped due to natural diffusion. There are no technical problems and one can continue driving without any concerns. For this reason, only one information symbol can be seen in the KOMBI.

The Check Control message can appear as follows (example in German and English):



Second level of message:

The message of the second level takes place if the tyre pressure has dropped below the legal threshold value and limits the comfort and safety of the customer. Accordingly, a Check Control message and a yellow warning light can be seen in the KOMBI. However, one can continue driving moderately, but the tyre pressure should be corrected as soon as possible.

The Check Control message can appear as follows (example in German and English):



Third level of message:

If the tyre pressure drops too much, the yellow warning light is displayed. The customer should perform a visual check of the tyres and correct the tyre pressure if possible.

Here is an example of the message for the front left tyre (example in German and English):



Vehicles concerned: BMW, MINI and Rolls-Royce with SA2VB

Procedure: All three Check Control messages are notices for the dropped tyre pressure. The RDC system thus works correctly and trouble-free. An OBD diagnosis is never necessary, as no fault memory (DTC) is created.

The customer is informed that only the tyre pressure should be corrected and reset via the CID.

For the second and third level, the tyre and valve must also be checked for tightness and damages, for this also see PuMA measure 60186974.



Ignition key data tapping on CBS vehicles

Situation: In the interests of simplifying the service reception, the current vehicle data (e.g. CBS remaining values) are stored in the ignition key used last.

Note: The ignition key is overwritten with the current data during a journey at specific intervals. As this writing process is repeated only after a defined distance, the key data may differ at service reception slightly from the most up-to-date vehicle data.

If a spare key with an outdated data status is handed over to the Service Advisor, it must be updated in the vehicle before service reception.

Procedure: The process for writing the current vehicle data to the ignition key can be activated manually in the vehicle.

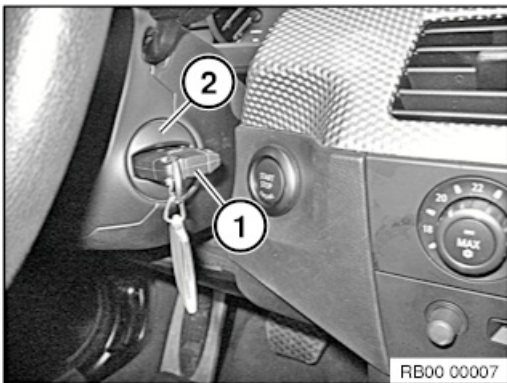
Data tapping in vehicles with key slot (E Series and MINI):



Sit in the vehicle and closed the door.

Note:

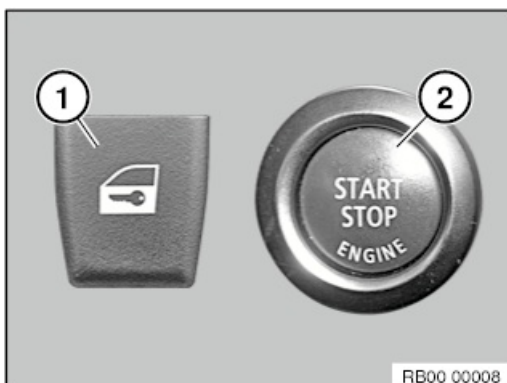
Check the currency of the date and time settings in the vehicle.



Insert the ignition key (1) into the ignition slot (2) until it is locked.

Note:

The vehicle displays turn on.



Press button combination:

1. Press and hold down central locking (1).
2. Also press start/stop button (2).
3. Release start/stop button (2).
4. Release central locking (1).



An acoustic signal after approx. 10-15 seconds denotes the end of data transfer.

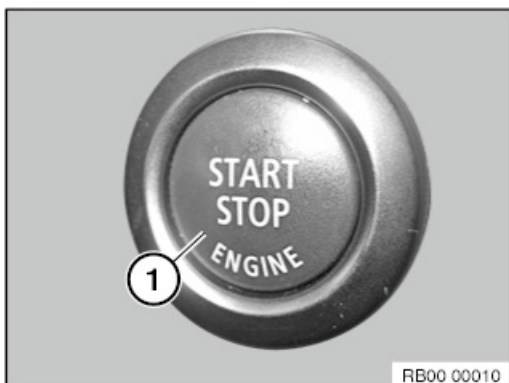
Note:

Acoustic signal immediately after data tapping indicates a fault message. The process must be repeated.

Data tapping in vehicles with no key slot (F Series):



Sit in the vehicle and closed the door.



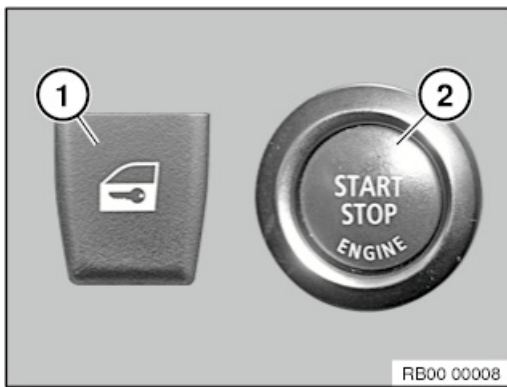
Press start/stop button (1) twice.

Note:

Make sure the display screen switches on.

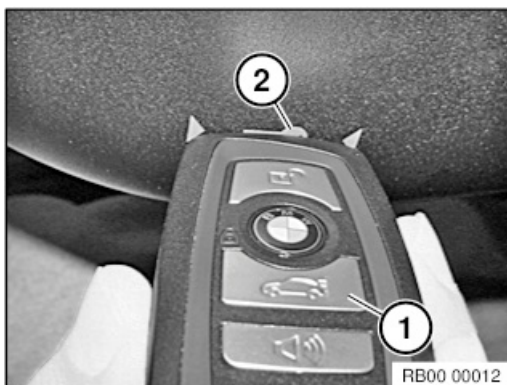
Check the currency of the date and time settings in the vehicle.





Press button combination:

1. Press and hold down central locking (1).
2. Also press start/stop button (2).
3. Release start/stop button (2).
4. Release central locking (1).



Hold the ignition key (1) directly to the key symbol (2) on the steering column.

Note:

Hold the ignition key without moving it.

The Check Control message "update of key data" appears.



A sounding of the acoustic signal two times and a disappearing of the triangle notice in the KOMBI signifies the end of the transfer.

Note:

No acoustic signal suggests faults during the data transfer. The process must be repeated.

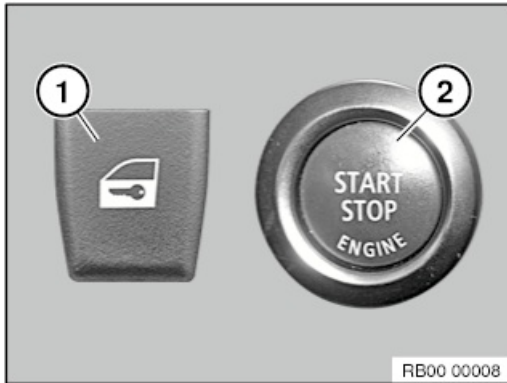
Data tapping in vehicles with no key slot (G Series):



Sit in the vehicle and closed the door.

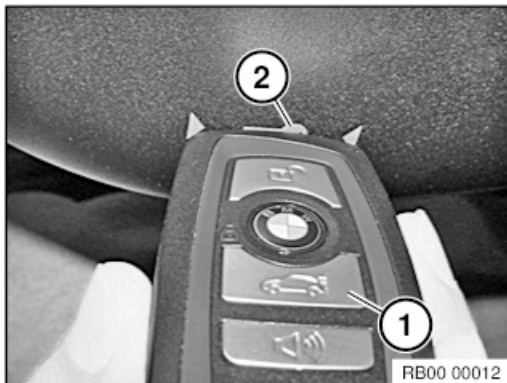
Note:

Check the currency of the date and time settings in the vehicle.



Press button combination:

1. Press and hold down central locking (1).
2. Also press the start/stop button (2) three times within 4 seconds.
3. Release central locking (1).

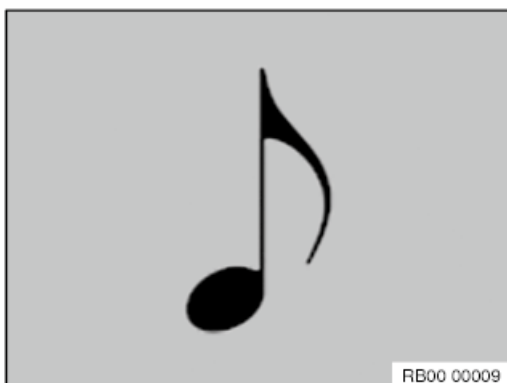


Hold the ignition key (1) directly to the key symbol (2) on the steering column within 10 seconds.

Note:

Hold the ignition key without moving it.

The Check Control message "update of key data" appears.



A sounding of the acoustic signal two times and a disappearing of the triangle notice in the KOMBI signifies the end of the transfer.



Note:

No acoustic signal suggests faults during the data transfer. The process must be repeated.



Inflation pressure measurement in vehicles with tyre pressure display RDC (SA2VB)

Situation: The standard equipment of all new vehicles will in future cover a tyre pressure display RDC (SA2VB) for each individual wheel. Sensors on all four wheels enable a precise and individual monitoring of the tyre pressure. The respective current tyre pressure is displayed on the control display or in the KOMBI, depending model and equipment. In the event of a pressure deviation, the driver is alerted to a potential danger with an early warning signal.

In order to prevent false warning messages in customer use, Service must ensure that the tyre pressure is correctly adjusted.

In the event of a tyre pressure loss of at least 20% or if pressure drops below the lower warning threshold value, the warning signal in the vehicle is activated. The lower warning threshold level takes account of the influencing factors and tolerances at a maximum of 1.8 bar.

The warning message can be affected by a range of influencing factors:

1. Low pressure difference between the setpoint value and the lower warning threshold value.
2. Temperature fluctuations during inflation pressure measurement/correction.
3. Tyre pressure losses when disconnecting the tyre inflator at the valve.
4. Pressure indicator tolerance on the tyre inflator.

Additional information on the tyre pressure display (RDC) can be found in the functional description "Tyre pressure control".

Vehicles concerned: BMW, MINI and Rolls-Royce with SA2VB

Procedure: There are number of influencing factors that must be considered when measuring inflation pressure in Service:

1. Avoid tyre pressure losses when disconnecting the tyre inflator at the valve.
=> In the event of tyre pressure loss, check the tyre pressure and adjust if required.
2. Observe the tolerance of the tyre inflator when measuring inflation pressure.
=> The indicated value of tyre pressure label must be increased by 0.1 bar to compensate the tolerance in the tyre pressure device.

Attention!

When compensating the tolerance, the maximum pressure value indicated on the tyres must not be exceeded.

Recommendation:

As described in the Owner's Handbook, customers must be made aware of the need to regularly check the air pressure in the tyres and to reset the tyre pressure indicator.



00 08 16 (372)

Maintenance content MINI R55, R56, R57, R58, R59, R60, R61

Situation: In the MINI models (R5x, R6x), the already familiar CBS service intervals are used.

Vehicles concerned: R55, R56, R57, R58, R59, R60, R61

Procedure: Intervals as stated below refer only to the ECE basic interval.

Country specific deviations may apply. For countries with lower-quality fuel grades, comply with the country-specific intervals.

Diesel models (W16) up to production date 07/2010:

Change engine oil approximately every 20,000 km/24 months.

- Microfilter:
Renew at every 2nd engine oil change (approx. 40,000 km).
- Air filter:
Renew at every 3rd engine oil change (approx. 60,000 km).
- Diesel engine > fuel filter:
Renew at every 3rd engine oil change (approx. 60,000 km).

Carry out vehicle check every 60,000 km (48 months).

Diesel models (N47) up to production date 08/2010 and all petrol models:

Change engine oil approximately every 30,000 km/24 months.

- Microfilter:
Renew at every engine oil change (approx. 30,000 km).
- Air filter:
Renew at every 2nd engine oil change (approx. 60,000 km).
- Petrol engine > spark plugs:
Renew at every 2nd engine oil change (approx. 60,000 km).
- Petrol engine John Cooper Works -> spark plugs:
Renew at every engine oil change (approx. 30,000 km).
- Diesel engine > fuel filter:
Renew at every 2nd engine oil change (approx. 60,000 km).

Carry out vehicle check every 60,000 km (48 months).

Carry out maintenance work as described in ISTA and Commercial Service Data.



00 10 12 (831)

Maintenance work MINI COOPER S JCW (N18) - reduction spark plug interval

Situation: Due to current quality testing, the spark plug interval in the new John Cooper Works models with engines N18 have been reduced to the previous interval of 30,000 km (with every engine oil service).

Vehicles concerned: R55 COOPER S JCW

R56 COOPER S JCW

R56 COOPER S JCW GP2

R57 COOPER S JCW

R58 COOPER S JCW

R59 COOPER S JCW

R60 COOPER SX JCW

R61 COOPER SX JCW

Procedure: Intervals as stated below refer only to the ECE basic interval.

Country specific deviations may apply. For countries with lower-quality fuel grades, comply with the country-specific intervals.

Change engine oil approximately every 30,000 km/24 months.

- Microfilter:
Renew at every engine oil change (approx. 30,000 km).
- Air filter:
Renew at every 2nd engine oil change (approx. 60,000 km).
- Spark plugs:
Renew at **every engine oil change (approx. 30,000 km)**.

Carry out vehicle check every 60,000 km (48 months).

Carry out maintenance work as described in ISTA and Commercial Service Data.



00 21 13 (967)

Parking brake function check - new procedure in the standard service scope/rear brake service

Situation: The different procedures for the check of the parking brake during a service have been standardised for all BMW and MINI models.

Vehicles concerned: All BMW CBS vehicles
All MINI CBS vehicles

Procedure: **Standard scope of service**

New check point: Parking brake function check without brake test stand.

=> When the vehicle is brought into the workshop the parking brake must be checked for correct function.

Engine oil service / Brake fluid service

All scopes of inspection for the parking brake are deleted (parking brake/Automatic Hold brake).

Service - rear brakes

Changed check point: Parking brake function check on brake test stand.

=> It is no longer necessary to remove the brake discs during the parking brake function check.

=> If the parking brake (with parking brake shoes) malfunctions, the brake disc is to be disassembled and the parking brake repaired. Calculation of the invoicing is carried out separately.

Carry out maintenance work as described in ISTA and Commercial Service Data.



00 63 14 (204)

Petrol additive - we recommend regular use with N13 and N18 engines

Situation: Regular use of fuel additives is recommended to prevent coking of intake valves and injectors (in direct fuel injection).

Vehicles concerned: All BMW vehicles with engine N13

All MINI vehicles with engine N18

Procedure: We recommend adding two cans of petrol additive to the fuel tank during each engine oil change.

Inform customers during each service appointment to regularly use petrol fuel additive.

We recommend adding one can of petrol additive to the fuel tank each time when refuelling.

BMW part number: 83 19 2 183 738

MINI part number: 83 19 2 350 552



00 21 11 (715)

Petrol additive - we recommend regular use with petrol engines

Situation: Regular use of fuel additives is recommended to prevent coking of intake valves and injectors (in direct fuel injection).

Vehicles concerned: All BMW, MINI and Rolls-Royce with petrol engine.

Procedure: We recommend adding two cans of petrol additive to the fuel tank upon each engine oil change:

- When fuel tank full: 2 cans of petrol additive
- When fuel tank half-full: 1 can of petrol additive

Customers should be advised during every service appointment to regularly use BMW petrol additive. We recommend adding one can of petrol additive to the fuel tank each time when refuelling.

BMW part number: 83 19 2 183 738

MINI part number: 83 19 2 350 552



00 09 12 (819)

Service engine oil - interval reduction MINI for countries with lower quality fuel grades

SA8KL, SA8KK, SA8KM

Situation: In the interests of safeguarding mobility, the engine oil service intervals were adapted for all new MINI vehicles from production date 07/2012 or 11/2012 in countries with lower quality fuel grades. The engine oil service intervals SA8KL (15,000 km/ 12 months), SA8KK (15,000 km/ 18 months) or SA8KM (12,000 km/ 12 months) are programmed at the factory in these countries.

Vehicles concerned: SA8KL/SA8KK:

MINI R55, R56, R57, R58, R59 and R60 petrol vehicles from production date 07/2012.

SA8KM:

MINI R55, R56, R57, R58, R59 and R60 petrol vehicles from production date 11/2012.

Procedure: Oil service interval SA8KL (Mexico):

Carry out engine oil change approx. every 15,000 km (12 months).

Change intervals that are linked with the engine oil service:

- Microfilter:
Renew at every 2nd engine oil service (approx. 30,000 km)
- Air filter:
Renew at every 4th engine oil service (approx. 60,000 km)
- Spark plugs:
Renew at every 4th engine oil change (approx. 60,000 km)
JOHN COOPER WORKS => replace at every 2nd engine oil change (approx. 30,000 km)

Carry out vehicle check at approx. 60,000 km/ 48 months.

Oil service interval SA8KL (Canada):

Carry out engine oil change approx. every 15,000 km (12 months).

Change intervals that are linked with the engine oil service:

- Air filter:
Renew at every 5th engine oil service (approx. 75,000 km)
- Spark plugs:
Renew at every 6th engine oil change (approx. 90,000 km)
JOHN COOPER WORKS => replace at every 3rd engine oil change (approx. 45,000 km)

Microfilter renew at every brake fluid service.

Carry out vehicle check at approx. 48,000 km/ 48 months.

Oil service interval SA8KK (Russia):

Carry out engine oil change approx. every 15,000 km (18 months).

Change intervals that are linked with the engine oil service:

- Microfilter:
Renew at every 2nd engine oil service (approx. 30,000 km)
- Air filter:
Renew at every 4th engine oil change (approx. 60,000 km)
- Spark plugs:
Renew at every 3rd engine oil change (approx. 45,000 km)
JOHN COOPER WORKS => replace at every 2nd engine oil change (approx. 30,000 km)



- Diesel fuel filter:

Renew at every 4th engine oil service (approx. 60,000 km)

Carry out vehicle check at approx. 60,000 km/ 48 months.

Oil service interval SA8KM (replaces SA8KE):

Carry out engine oil change approx. every 12,000 km (12 months).

Change intervals that are linked with the engine oil service:

- Microfilter:

Renew at every 2nd engine oil service (approx. 24,000 km)

- Air filter:

Renew at every 5th engine oil change (approx. 60,000 km)

- Spark plugs:

Renew at every 4th engine oil change (approx. 48,000 km)

Carry out vehicle check at approx. 60,000 km/ 48 months.

The change intervals that are due at the Service visit and the corresponding links for microfilters, air filters, spark plugs, fuel filters and the vehicle check are displayed correctly via ISPA depending on the service interval coding.

Country-specific deviations of the change intervals are possible depending on market requirements. This is manually controlled in each market.

The maintenance work must be carried out as shown in the Commercial Service Data and ISTA.



00 02 10 (661)

Service intervals for countries with low fuel grade (SA988/SA8KE, SA8KM, SA984, SA8KK, SA8KL, SA8KH, SA8KP)

BMW and MINI

Situation: To ensure mobility, various service intervals (poor-fuel intervals) are targeted ex-works (depending on country requirements).

Vehicles concerned: BMW and MINI

Measure: Note:

In countries with higher levels of dust, the air cleaner should be checked for contamination at every engine oil service. If there is significant contamination, the change interval must be accordingly reduced.

Oil service interval SA988 (petrol):

Carry out engine oil change approx. every 12,000 km (24 months).

Change intervals that are linked with the engine oil service:

For vehicles built up to 09/2008:

- Replace the microfilter at every 2nd engine oil change
- Replace the air filter at every 6th engine oil change
- Replace the spark plugs at every 6th engine oil change

For vehicles built up to 03/2009:

- Replace the microfilter at every 2nd engine oil change
- Replace the air filter at every 6th engine oil change
- Replace the spark plugs at every 5th engine oil change

For vehicles built from 03/2009:

- Replace the microfilter at every 2nd engine oil change
- Replace the air filter at every 5th engine oil change
- Replace the spark plugs at every 5th engine oil change

For M vehicles (E6x, E8x and E9x):

- Replace the microfilter at every 2nd engine oil change
- Replace the air filter at every 5th engine oil change
- Replace the spark plugs at every 6th engine oil change
- Replace the final drive oil at every 6th engine oil change
- Replace manual gearbox oil or SMG transmission oil (clean SMG transmission oil filter) at every 6th engine oil change

Note: not for twin-clutch gearbox!

Carry out vehicle check after 48 months, at the latest.

Oil service interval SA8KE:

Carry out engine oil change approx. every 12,000 km (24 months).

Change intervals that are linked with the engine oil service:

- Replace the microfilter at every 2nd engine oil change
- Replace the air filter at every 5th engine oil change
- Replace the spark plugs at every 5th engine oil change
- Only for M-vehicles (F1x):
Replace the final drive oil at every 7th engine oil change
- Only in hybrid cars (F01H, F02H, F10H and F30H)



Replace automatic transmission fluid at every 5th engine oil change.

Carry out vehicle check at each fifth engine oil service or after 48 months, at the latest.

Oil service interval SA8KM:

Carry out engine oil change approx. every 12,000 km (12 months).

Change intervals that are linked with the engine oil service:

- Replace the microfilter at every 2nd engine oil change
- Replace the air filter at every 5th engine oil change

Only for **F15/F16 with engine N63**: Replace air cleaner during every engine oil change

- Replace the spark plugs at every 4th engine oil change

Only for **I12** and **MINI John Cooper Works (R55, R56, R57, R58, R59, R60, R61)**:

Replace spark plugs at every 2nd engine oil change

- Renew fuel filter (diesel) with every 5th engine oil change
- M vehicles only:

Replace the final drive oil at every 7th engine oil change

- Only in hybrid cars (F01H, F02H, F10H and F30H)

Renew automatic transmission fluid at every 5th engine oil change

- I12 only:

Check bolting of door hinge at every 2nd engine oil change

Renew gas pressure spring of front door at every 4th engine oil change

Build date up to and including version 02/2015: Renew drive belt at every 5th engine oil change

Carry out vehicle check at each fifth engine oil service or after 48 months, at the latest.

Oil service interval SA984 (diesel fuel):

Carry out engine oil change approx. every 15,000 km (24 months).

Change intervals that are linked with the engine oil service:

For vehicles built up to 03/2009:

- Replace the microfilter at every 2nd engine oil change
- Replace the air filter at every 6th engine oil change
- Replace the fuel filter at every 6th engine oil change

For vehicles built from 03/2009:

- Replace the microfilter at every 2nd engine oil change
- Replace the air filter at every 4th engine oil change
- Replace the fuel filter at every 4th engine oil change

Carry out vehicle check after 36 months, at the latest.

Oil service interval SA984 (petrol):

Carry out engine oil change approx. every 24,000 km (24 months).

Change intervals that are linked with the engine oil service:

For vehicles built up to 09/2008:

- Replace microfilter at every engine oil change
- Replace the air filter at every 4th engine oil change
- Replace the spark plugs at every 4th engine oil change

For vehicles built up to 03/2009:

- Replace microfilter at every engine oil change
- Replace the air filter at every 4th engine oil change
- Replace the spark plugs at every 3rd engine oil change



For vehicles built from 03/2009:

- Replace microfilter at every engine oil change
- Replace the air filter at every 3rd engine oil change
- Replace the spark plugs at every 3rd engine oil change

Carry out vehicle check after 48 months, at the latest.

Oil service interval SA8KK:

Carry out engine oil change approx. every 15,000 km (18 months).

Change intervals that are linked with the engine oil service:

- Replace the microfilter at every 2nd engine oil change
- Replace the air filter at every 4th engine oil change
Only for **F15/F16 with engine N63**: Replace air cleaner during every engine oil change
- Replace the spark plugs at every 3rd engine oil change
Only for **I12 and MINI John Cooper Works (R55, R56, R57, R58, R59, R60, R61)**:
Replace spark plugs at every 2nd engine oil change
- Renew fuel filter (diesel) with every 4th engine oil change
- M vehicles only:
Replace the final drive oil at every 6th engine oil change
- Only in hybrid cars (F01H, F02H, F10H and F30H)
Replace automatic transmission fluid at every 4th engine oil change.
- I12 only:
Check bolting of door hinge at every engine oil change
Renew gas pressure spring of front door at every 2nd engine oil change
Build date up to and including version 02/2015: Renew drive belt at every 4th engine oil change

Carry out vehicle check at each fourth engine oil service or after 36 months, at the latest.

Oil service interval SA8KL:

Carry out engine oil change approx. every 15,000 km (12 months).

Change intervals that are linked with the engine oil service:

- Replace the microfilter at every 2nd engine oil change
- Replace the air filter at every 4th engine oil change
For countries with higher levels of dust: Check the air cleaner for contamination and reduce the change interval if applicable!
- Replace the spark plugs at every 4th engine oil change
- Renew fuel filter (diesel) with every 4th engine oil change
- M vehicles only:
Replace the final drive oil at every 6th engine oil change
- Only in hybrid cars (F01H, F02H, F10H and F30H)
Replace automatic transmission fluid at every 4th engine oil change.

Carry out vehicle check at each fourth engine oil service or after 48 months, at the latest.

Oil service interval SA8KH:

Carry out engine oil change approx. every 20,000 km (18 months).

Change intervals that are linked with the engine oil service:

- Replace microfilter at every engine oil change
- Replace the air filter at every 3rd engine oil change
For countries with higher levels of dust: Check the air cleaner for contamination and reduce the change



interval if applicable!

- Replace the spark plugs at every 3rd engine oil change
- Renew fuel filter (diesel) with every 3rd engine oil change
- M vehicles only:

Replace the final drive oil at every 4th engine oil change

- Only in hybrid cars (F01H, F02H, F10H and F30H)

Replace automatic transmission fluid at every 3rd engine oil change.

Carry out vehicle check at each third engine oil service or after 36 months, at the latest.

Oil service interval SA8KP (petrol):

Carry out engine oil change approx. every 8,000 km (12 months).

Change intervals that are linked with the engine oil service:

- Replace the microfilter at every 2nd engine oil change
- Replace the air filter at every 7th engine oil change

For countries with higher levels of dust: Check the air cleaner for contamination and reduce the change interval if applicable!

- Replace the spark plugs at every 7th engine oil change

Carry out vehicle check at each 7th engine oil service or after 48 months, at the latest.

Procedure: The change intervals that are due at the Service visit and the corresponding links for microfilters, air filters, spark plugs, fuel filters and the vehicle check are displayed correctly via ISPA depending on the service interval coding.

Country-specific deviations of the change intervals are possible depending on market requirements. This is manually controlled in each market.

The maintenance work must be carried out as shown in the Commercial Service Data and ISTA.



Service Sheets - Condition-based Service/Pre-delivery Check (ISTA, ISPA, Commercial Service Data)

BMW, MINI

Situation: The information "**Condition-based Service - Service Sheets**" is generally available via **ISPA** and **Commercial Service Data** for Condition-based Service and service interval indicator vehicles, which must be printed within the framework of the order preparation.

ISPA offers the advantage of only showing the due scopes of service work on a vehicle-specific basis.

Technical information is available in **ISTA**.

Procedure: • Service sheets:

The service sheet is printed out with ISPA or Commercial Service Data in the course of the service consultation.

- a. ISPA: Read in ignition key -> Scopes of service work are selected/Select -> Menu Job order basis -> Print service sheet
- b. ISPA: Open key data application -> Menu Job order basis -> Print manual service sheet -> Vehicle identification (17-character vehicle identification number) -> Print service sheet
- c. KSD: Vehicle identification -> Maintenance (Inspection Sheets) -> Condition-based Service

Note: Country-specific deviations of the intervals shown on the Inspection Sheet are possible. Observe maintenance requirement in ISPA!

The engine oil top-up quantity can alternatively be determined via ISTA, EPC or KSD (Commercial Service Data).

- a. ISTA: Vehicle identification -> Product structure -> Technical data -> 11 Engine -> 11 40 Oil supply / 11 00 Overview of Technical Data
- b. EPC: Vehicle identification (vehicle identification number) -> Additional information -> Capacities
- c. KSD: Vehicle identification (vehicle identification number) -> Packages -> Maintenance -> Service engine oil

or

KSD: Vehicle identification (vehicle identification number) -> Maintenance (Inspection Sheets) -> Condition-based Service -> Service engine oil

Additional information on the scopes of maintenance work is available in ISTA:

Product structure -> Repair instructions -> 0 Maintenance and general information

- Pre-delivery check:

The pre-delivery check is printed out with ISPA, ISTA or Commercial Service Data in the course of the service consultation.

- a. ISPA: Read in ignition key with due pre-delivery check -> Menu Job order basis -> Print pre-delivery check
- b. ISTA: Vehicle identification -> Product structure -> Repair instructions -> 0 Maintenance and general information -> Pre-delivery check
- c. KSD: Vehicle identification -> Maintenance (Inspection Sheets) -> Pre-delivery check

- Further information:

ISTA: Vehicle identification -> Product structure -> Repair instructions -> 0 Maintenance and general information





00 03 11 (681)

Service, brake fluid (harmonisation, parking brake check)

Situation: Checking the parking brake is moved from engine oil service to brake fluid service.

Vehicles concerned:

- All new vehicle launches as from F20 (excluding vehicles with electromechanical parking brake)
- The conversion has already been performed in the service contents/service sheets for the following series:
 - MINI (R55, R56, R57, R60)
 - X1 (E84)
 - X5 (E70, E71, E72)
- The service contents/service sheets will be converted as per 09/2011 for the following series:
 - 7-Series (F01, F02, F03, F04)
 - 5-Series GT (F07)

Procedure: Please see the updated service sheets in KSD and ISTA for the respective service scopes.



00 13 11 (697)

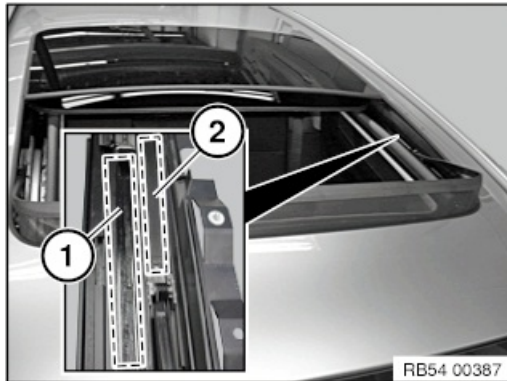
Standard work scope - expansion of work scope (with slide/tilt sunroof and panorama glass roof)

Check guide rails and water drain channels in slide/tilt sunroof or panorama glass roof for dirt contamination

Situation: During a regular workshop visit in the course of maintenance (standard service scope), the guide rails and water drain channels in slide/tilt sunroof or panorama glass roof must be checked for dirt contamination.

Vehicles concerned: All BMW, MINI and Rolls-Royce with slide/tilt sunroof and panorama glass roof.

Procedure:



Glass slide/tilt sunroof panel fully open.

Check guide rail (1) and water drain channel (2) on left and right for dirt contamination. In the case of dirt contamination, guide rail (1) and water drain channel (2) on left and right must be cleaned against separate charge.

Check the spare wheel well and luggage compartment side boxes for moisture. If moisture is found, note the procedure of the respective vehicle-specific Product and Measures Management Aftersales (PuMA) measure.



00 05 09 (608)

Emergency Services (BMW/MINI) from issue September 2009

new OSS address

Situation: An update of the Emergency Services is no longer available on the Aftersales Assistance Portal (ASAP). A current version of the Emergency Services now only at the online Service System for BMW Service and MINI Service (OSS) at the following Internet address:

- <https://oss.bmw.de/index.jsp>

Affected vehicles: BMW and MINI



Battery recharging intervals for booth vehicles, battery charging calendars and battery tags (12-V battery, high-voltage battery unit)

All models

Situation: Due to the self-discharging of the vehicle battery (12 V battery, high-voltage battery unit) and vehicle standby current (if the vehicle battery was not disconnected from the vehicle electrical system), the vehicle battery is discharged slowly, but continuously.

If the vehicle battery is not recharged for an extended period of time, it will be damaged. This will result in a premature battery failure.

Measure: To maintain the quality of the vehicle battery in standing vehicles, it is necessary to recharge this vehicle battery regularly.

Procedure: Recharging intervals:
12V battery

All vehicles:

- 12-V battery connected to the vehicle electrical system: **6 weeks**

All vehicles without BMW i and Plug-in Hybrid (PHEV):

- Continuous disconnection of the 12-V battery from the vehicle electrical system by removal of the ground cable to the 12 V battery or by switching off of the fitted battery master switch, if installed:
12 weeks

High-voltage battery units:

- All vehicles: **6 weeks**
- Plug-in-hybrid (PHEV): as required

The recharging intervals follow the battery charging calendar.

Recharge when the colour of the calendar week on the battery calendar matches the colour of the battery tag. Battery tags are located on all new vehicles' interior mirror.

N.B.:

1. Since different systems are used by distribution channels for documentation, it is not always clear whether the vehicle battery was actually recharged during the week that is indicated. Therefore all recharge procedures must also be documented on the battery tag on the interior mirror (write date of recharge with a smudge-proof pen and confirm that the work has been carried out with your signature next to the date). The battery tag remains in the vehicle until the vehicle is handed over to the customer and is then filed with the vehicle records.
2. Dealers who store the vehicles externally (e.g. at freight forwarding businesses) are responsible for making sure that the vehicle batteries for these vehicles are recharged according to the battery charging calendar.
3. For vehicles in show rooms, the battery tags must be placed in the glove box. In the case of an increased draw on the charge (e.g. when doors are opened, the radio is turned on, electrical seat adjustment is operated), much shorter recharging intervals are required on these vehicles (e.g. every night) so that a total battery discharge is reliably avoided. It is however better to provide for charge compensation by means of a permanent support charge in the showroom.

"Trickle charger" SI 02 03 05 (205)

Parts:
Battery log form (not just for USA)
{Battery Log Form} (for USA only)



<u>Designation</u>	<u>Part number</u>	<u>Quantity</u>
<u>Battery tag, coloured</u>		
whisky	01 89 9 781 424	as needed
sun yellow	01 89 9 781 425	as needed
emerald	01 89 9 781 426	as needed
california blue	01 89 9 781 427	as needed
brick red	01 89 9 781 428	as needed
Grey	01 89 9 781 429	as needed



Battery recharging intervals for booth vehicles, battery charging calendars and battery tags (12-V battery, high-voltage battery unit)

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{Battery Log Form} (for USA only)



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<u>Battery tag, coloured</u>		
whisky	01 89 9 781 424	as needed
sun yellow	01 89 9 781 425	as needed
emerald	01 89 9 781 426	as needed
california blue	01 89 9 781 427	as needed
brick red	01 89 9 781 428	as needed
Grey	01 89 9 781 429	as needed



00 02 06 (296)

Drawbar load sign omitted

All with options 235 and 3AC

Situation: There have been new vehicle documents since 2005-10-01.
Beginning with this production date, vehicles no longer need to be equipped with the trailer hitch drawbar load sign.
Corresponding information on the options is provided in the vehicle documents.
The regulation pertains to all series.



New repair methods "Gluing / Riveting" on steel bodies

BMW/MINI

Situation: Advance technical developments in the field of adhesives and equipment technology have made modified repair methods possible. This procedure has been tested and approved following exhaustive endurance runs and corrosion tests in the Development division.

Similar to the procedure for the tail panel on the F01/F02, the repair methods "welding/soldering" will change to "gluing/riveting" on various outer skin and structural components of steel bodies from the launch of the E89 and R57. This procedure has already been introduced for repair work on the reduced-weight aluminium front end (GRAV) of the E60.

The repairs can be performed by all workshops that have participated in a GRAV or the current bonding and riveting training, in combination with the training video.

Another positive point of this method is the significantly improved corrosion protection resulting from the wide-area bonding of the spare part coating (KTL).

Procedure: Essentially, the following components are affected:

- Rear side wall
- Tail panel
- Boot floor
- Roof outer skin
- engine carrier
- support carrier

Model series affected:

- MINI (R55, R56, R57)
- BMW 1 Series (as of E8x)
- 3 Series (as of E9x)
- 5 Series (as of E60)
- X1 (E84)
- X5 (E70)
- X6 (E71)
- Z4 (E89)
- 7 Series (as of F01)

And all future series.

Necessary workshop equipment:

- Punch riveting tool
- Blind riveting tongs
- Cartridge gun for body glue
- Universal collet (for roof ducts)
- Infrared lamp

For more information on the required tools, see Service Information.

Parts required:

The new parts and consumables required for the respective scope of repair work are listed in the Electronic Parts Catalogue (EPC).

In addition, vehicle-specific service repair packages are also offered. Here, the vehicle identification number is to be entered in KSD2, the corresponding "Packages" button selected and the required job item selected in main group 41.

Repair instructions:

The repair instructions have been revised to take account of the new repair method:

To differentiate the individual repair methods, the repair stage is inserted in the repair instructions.



- Repair stage 1: All repairs that only provide for replacement of screwed/bolted components and planishing operations.
- Repair stage 2: Repairs that are carried out by bonding and riveting without the use of a straightening bench.
- Repair stage 3: Repairs that are carried out by bonding and riveting with the use of a straightening bench or welding.

Training video for bonding and riveting:

The new methods, for example "punch riveting", have been described on a training video that will be distributed to National Sales Companies.

Please make sure the training video is made available to the staff who will be performing this work and, if you do not perform body repair in your own workshop, to the staff of your specialist body workshop.

The BMW paint brochure can be ordered via the usual parts-related channel under the BMW parts number 01 69 0 037 577.

Time allowances:

Time allowances (flat rates) have been revised to take account of the new repair methods and shall apply retrospectively.



66 01 07 (394)

Notes on radio-operated system (vehicle access, radio-operated opening, radio-operated closing)

All

Situation: With some functional procedures and unintended activations, use of the radio-operated systems for vehicle access, radio-operated opening and radio-operated closing leads to faulty interpretations and thus to complaints.

Procedure: The known complaint cases are described in the following appendices. Each case is presented with its causes and any necessary measures.

Enclosure 1: Self-locker

Enclosure 2: Range problem

Enclosure 3: Selective unlocking

Enclosure 4: Convenient access/convenient opening

Enclosure 5: Radio remote control failed/poor radio reception

Enclosure 6: Self-opener



31 01 12 (833)

Visible corrosion on vehicle add-on parts

Situation: Since the market introduction of the E65/66 the engine compartment and underbody preservation has successively been dropped from all series for environmental protection reasons. This may result in visible corrosion of machined surfaces such as, for example, on chassis/suspension components, machined screwing/bolting points, screw connections, or on surfaces such as, for example, the joints and drive shafts!

To prevent or re-treat this surface corrosion, the dealer organisation should use the corrosion protection with BMW part number 83 19 2 317 997.

Vehicles concerned: All BMW, MINI series

Procedure: Apply a thin coating of corrosion inhibitor (using only a brush) to the affected areas.

Warning!

Risk of fire!

Do not apply any corrosion inhibitor to the engine or the exhaust system!



Arguments pertaining to engine oil consumption

BMW, MINI

Subject matter

Customers are often unsure when it comes to the subject of engine oil consumption. Is an engine allowed to consume oil? What are the most important causes of engine oil consumption?

The following explanations are intended to provide an aid to argumentation. They are aimed at all dealership staff who have contact with customers.

Functions of engine oil

Engine oil is one of the most important operating fluids in a combustion engine. The engine cannot work properly without engine oil. The main functions of engine oil are:

- Lubrication
- Cooling
- Prevention of corrosion and sedimentation

Lubrication

The lubricating film of the engine oil is exposed to a wide range of demands. The viscosity of the engine oil should not be too high at low temperatures so as to ensure optimum lubrication already at cold engine temperatures (e.g. cold starting). On the other hand, the engine oil should not be too thin-bodied at high temperatures as this can break down the lubricating film and nullify the lubricating effect entirely.

The most important function of the engine oil is to minimise friction between metal surfaces. This function is effected by a lubricating film which builds up during operation between the surfaces of the moving engine components. The thin oil film reduces friction significantly, which translates into lower wear and lower heat generation. As well as preventing piston seizures and bearing damage, it extends the service life of all the relevant engine components and reduces fuel consumption.

Another function of the oil film is to seal the combustion chamber against the crankcase via the piston rings.

Cooling

The pistons already reach their operating temperature shortly after the engine is started. It can take a few minutes, depending on the ambient temperature, the engine design and the driving style adopted, for the engine block and thus the cylinder walls to reach their operating temperature. The engine needs a fully functioning cooling system to stop it from exceeding the operating temperature. Aside from the two classic cooling components - air and coolant - engine oil is often underestimated or even forgotten as a crucial cooling component. The engine oil is responsible for a significant degree of cooling inside the engine. Specifically to cool the piston crowns, virtually all BMW engines have oil spray nozzles which moisten the piston crowns with engine oil.

Prevention of corrosion and sedimentation

Last but not least, it is the job of the engine oil to protect the engine against corrosion and sedimentation. Aggressive combustion residues are neutralised by the lubricating oil and appropriate additives. The remaining combustion residues are carried by the oil circuit to the oil filter, where they are filtered, or settle in the oil sump.

Engine oil consumption

Engine oil consumption is dictated above all by the structural design of the individual assemblies or systems. Every combustion engine has a system-dictated consumption of lubricating oil. Decisive causes of engine oil consumption are:

- Pistons with piston rings
- Valve stem seals
- Crankcase ventilation

The surface topography used of cylinder barrel and piston ring is the primary variable which directly influences engine oil consumption, since the piston rings do not constitute a perfect seal, but instead act as a metering unit. With regard to design, there is a conflict of interests between engine oil consumption and friction loss. The latter has a direct effect on power and fuel consumption. In each piston stroke tiny quantities of engine oil are left on the cylinder walls and this oil is essential for lubricating the piston rings and the piston skirt (see above, lubricating film). During the piston downstroke the engine oil deposited on the cylinder wall takes part in the



combustion close to the wall and is discharged with the combustion gases. The higher the engine speed, the greater the effect, since more combustion cycles per unit of time take place. For this reason, engines with a high rpm concept (BMW M engines) tend to have a higher engine oil consumption than other BMW engines. The same applies to the lubricating film on the valve stems.

Note:

For BMW spark-ignition and diesel engines, the maximum permissible engine oil consumption is 0.7 l/1000 km.

Because of their increased power output and torque, M engines have a maximum permissible oil consumption of 1.5 l/1000 km.

The measurable result of an engine oil consumption is overridden by the quality of the fuel used and of the driving profile. If, for example, in winter a lot of short distances are driven (= high fuel entry since the vaporisation temperature is for the most part only briefly achieved) and then a longer distance is driven (fuel can now vaporise), a significant drop in the engine oil level is encountered on this trip. This does not constitute engine oil consumption, but instead merely a different engine oil level on account of the fuel content in the engine oil. Customer complaints can often be put down to this fact. The situation can arise where the engine oil level drops over a few 100 km by around 1 litre. Added to this is some engines is a degree of uncertainty of up to 0.3 litres by the relevant measuring system (oil dipstick/QLT).

Even the oil mist particles entrained via the crankcase ventilation (separation efficiency technically never 100 %) take part with the intake air in the combustion process. The design is particularly problematic here. On the one hand, engine oil should be separated as fully as possible; on the other hand; crankcase pressure requirements must be satisfied. Moreover, conventional separation systems function to optimum effect only with a specific gas flow rate; the separation effect decreases with lower or higher gas quantities.

Summary

Every internal combustion engine has a technically necessary engine oil consumption. The level of engine oil consumption is clearly influenced by the driveability and by the fuel used.

Oil consumption measurement

The level of engine oil consumption that may arise with a particular engine can be determined by the customer only from the amount of engine oil he or she tops up with. As soon as the engine oil level falls below the maximum mark on the dipstick, many customers top up the engine oil without paying attention to a number of basic rules, such as the vehicle must be standing on level ground, a certain period of time must be left to allow the oil to flow back to the sump. In such cases, the available container sizes (e.g. 1-litre can) make it easy to top up above the maximum mark. Excess engine oil can cause engine damage and is consumed more quickly due to the effects of splash.

For this reason, it is advisable to let the engine oil level drop as far as the minimum mark and only then to add the required volume of engine oil. The difference between the two marks is approximately 1.0 to 1.5 litres.

The procedure for checking the oil level is given in the Owner's Handbook for the vehicle concerned.

The service delegates will only deal with claims made under warranty if exact measurements by weighing are available (see SBS 11 07 96 138, Enclosure 12).



00 26 11 (731)

Brake fluid - Operating Fluids Specification

Situation: To provide permanent surface protection in the brake system, only low viscosity DOT4 brake fluids that have been approved by BMW may be used.

Vehicles concerned: All BMW, MINI and Rolls-Royce.

Procedure: The low viscosity DOT4 brake fluids currently approved by BMW can be viewed in the current ISTA version (operating materials - main group 34).



00 38 11 (768)

Engine oil level check - customer recommendation

Situation: A correct engine oil level and the right engine oil quality are a precondition for avoiding engine damage.

Note:

Engine oil consumption depends on the driving style and the conditions of use.

Vehicles concerned: MINI R55, R56, R57, R58, R59, R60

All BMW vehicles with engine N13

Procedure: Make customers aware during every service appointment of the importance of checking the engine oil level regularly. The check is performed using the oil dipstick for engine oil in the engine compartment.

Important!

On the engine oil qualities that have been approved by BMW should be used.

The vehicle-specific Owner's Handbook contains the right procedure for checking the engine oil and the approved oil types.



00 30 11 (735)

Final drive oil - new oil quality from 07/2011

Situation: In motor vehicles from production date 07/2011, the final drive oil SAF-XO is being replaced by the final drive oil Hypoid Axle Oil G1 (BOT448).

Vehicles concerned: All BMW without M models

All MINI

All Rolls-Royce

Procedure: In vehicles from production date 07/2011, use oil specification Hypoid Axle Oil G1 (BOT448) for oil filling/additions to the rear axle differential.

The final drive oils currently approved by BMW can be viewed in the current ISTA version (operating materials - main group 33).



Annual vehicle inspection in compliance with labour protection and accident prevention according to Operating Safety Ordinance BGV D 29 and BBG 916

Germany only

Situation: In order to comply with European and German legislation on labour protection and the occupational safety of employees, it is necessary to observe the guidelines and directives drawn up by the German Social Accident Insurance Institution within the framework of accident prevention regulations:

1. German Social Accident Insurance Institution ordinance BGV D 29 “Accident prevention regulation - vehicles”

Accordingly an employer must have all vehicles which are used for commercial purposes by himself or by employees, regardless of whether they are officially registered or not, inspected to ascertain their operationally safe condition at least once per year.

Excluded from this requirement are private vehicles used for business or social purposes and test vehicles.

2. German Social Accident Insurance Institution principle BGG 916 “Inspection of vehicles by experts”

This inspection - as contemplated by the accident prevention regulations - can be conducted by an officially recognised specialist or inspector within the framework of a §29 inspection or also by an expert.

Experts as contemplated by this ordinance are persons who, as a result of their specialist training and experience, have knowledge in the field of automotive engineering and of the relevant labour protection and accident prevention regulations. These include in the automotive trade all skilled workers and workshop foremen.

The scope of inspection for “Operating Safety” must cover all matters pertaining to roadworthiness and occupational safety.

The inspection in accordance with BGV D 29 in conjunction with BGG 916 focuses on:

- Equipment required by law – warning triangle, first-aid kit
- High-visibility jacket
- Documents to be carried – car registration papers, Owner's Handbook, acceptance report, etc.
- Type approval of non-standard modifications, fittings, etc.
- View/windows – heating – mirrors – electrical equipment
- Moving add-on parts and body components
- Securing of loads – load area nets, lashing points, roof boxes
- Trailer tow hitch
- Grab handles, head restraints, seats, seat belts

Vehicle condition check:

- Passenger compartment, general condition
- Rims and tyres, type approval, condition, damage
- Lights, auxiliary headlamps
- Vehicle condition - exterior, underbody, loose parts
- Vehicle chequebook

The inspection is to be documented in the form of an inspection record, which is to be kept until the next inspection due.

Vehicles concerned: All BMW Group vehicles (cars and motorcycles), i.e. BMW, MINI, Rolls-Royce and BMW Motorrad and vehicles of other manufacturers in the company in question.

Procedure: If the inspection is not conducted on the basis of a §29 inspection, it can be conducted for passenger vehicles (vehicle category M1 up to 3.5 t permitted vehicle weight) by working through the inspection lists of the vehicle manufacturers provided that all the matters relevant to occupational safety and roadworthiness are taken into consideration. In practice the “large” inspection lists contain all the safety-relevant test points.

BMW vehicles with service interval indicators are covered in each case by the current Inspection Sheet II (see example in Appendix 2). These are all BMW vehicles up to and including E46 as well as E83 and E85 and MINI R50, R52 and R53.



Vehicles with CBS (Condition Based Service) are covered in each case by the current "Condition Based Service" list (see example in Appendix 3). These are all BMW vehicles from E65 and higher (but not including E83 and E85) as well as MINI from R56 and higher and Rolls-Royce.

Note: Changing service fluids, filters and spark plugs is not necessary in this respect and is dependent solely on the specified BMW service intervals.

In addition to the test specifications in the inspection lists it is also necessary to check for the **presence of first-aid kits and high-visibility jackets**. In the case of vehicles used for commercial purposes which in accordance with EC Regulation 3821/85/EC must be fitted with a **digital recording device** ("tachograph") in order to record driving times/rest periods and working hours, this requirement also covers checking for the presence and correct function of the recording device.

An inspection in accordance with the ordinance at hand is only then positively concluded if there are no defects/deficiencies.

When the inspection has been completed an inspection record as shown in the appendix complete with details of the object inspected, e.g. vehicle identification number, and the inspection date must be drawn up and initialled by the person inspecting. It is useful for this record also to be initialled by the relevant employer or his authorised person or representative.

A printed specimen of the inspection record is attached as Appendix 1 to this Service Information bulletin. Forms for the inspection results can be purchased from Carl Heymanns Verlag under the title "Prüfbefund über die regelmäßige Prüfung von Fahrzeugen durch den Sachkundigen".

For the sake of completeness the inspection sheet applicable to the vehicle to be inspected or a copy of the §29 inspection report should be attached to the inspection record.

An inspection badge as shown in the graphic can be attached to the vehicle on a voluntary basis; this is usually done only in the case of technical tools/work equipment or if the same vehicle is used for commercial purposes over a period of several years.



This badge can be obtained from for example the relevant German Social Accident Insurance Institution or the Internet: www.prüfplakette.com.

Notes: This vehicle inspection prescribed for occupational safety law reasons does not for vehicles with number plates replace the general inspections at the corresponding inspection intervals prescribed in accordance with the German road traffic legislation §29 StVZO.

It is also recommended to contact the German Social Accident Insurance Institution for the metalworking industry (BGM) or the vehicle operating trades (BGF) for information on the current ordinances and principles.

These vehicle inspections can also be offered as a service to external customers using vehicles for commercial purposes.

Reimbursement: No BMW flat rate units or defect codes are specified for this inspection since this scope cannot be invoiced through the warranty channel.



General and legal information on performing the periodic exhaust-gas (emissions) test in EU countries

BMW vehicles built between 1968 and 03/2012, MINI as from R50 and Rolls Royce as from RR01

Situation: I. In view of the EU updates of the regulations* covering the vehicle inspection at regular intervals, in which the exhaust-gas test forms part of the inspection, * = last version: 2010/48/EC of 05.07.2010

- and the proportionate adoption of EU-valid minimum emissions test inspection specifications by the German Ministry of Transport for the periodic motor vehicle inspection (§29_StVZO) as from mid-2012,
- and the easier comprehensibility and improved overview, e.g. division into EU specifications and specifications only applicable to Germany

the BMW Service Information bulletins pertaining to the exhaust-gas test which have been in circulation since 1993 are updated, restructured and divided into:

1. General and legal emissions test information
2. Emissions test instructions for BMW Group vehicles with petrol engines
3. Emissions test instructions for BMW Group vehicles with diesel engines
4. Emissions test instructions for BMW Group vehicles with alternative drives

II. Within the framework of this restructuring and updating the **General and legal information** on the exhaust-gas test will be set out in this Service Information bulletin.

1. EU matters (proportionately also applicable to some other ECE markets):

An exhaust emissions test at regular intervals was introduced from March 1998 at the latest in all EU countries for all passenger cars, trucks and buses. The exhaust emissions test forms part of the overall technical motor vehicle inspection. The basis for this is EU Directive 96/96/EC of 20.12.1996 together with its exhaust-related updates 2001/9/EC and 2003/27/EC. The currently valid version is EU Directive 2010/48/EC of July 2010. The inspection contents specified in the above-mentioned directives are minimum scopes which however, depending on the EU state and particular reasons, e.g. high air pollution, large proportion of traffic, may be nationally extended or intensified.

The inspection intervals vary, depending on the country, for privately used vehicles between 2 and 4 years for the first inspection, and then repeated every 2 years. An annual interval applies to all commercially used hire vehicles and passenger vehicles as well as to goods vehicles starting at 3.5 t in weight.

With regard to the inspection contents, a distinction is made between the type of drive:

- all vehicles with engines with externally supplied ignition or petrol engines from 1968
- all diesel-engine vehicles from 1980

For vehicles with alternative drives, e.g. hybrid systems, the vehicle manufacturer can, in line with the above-mentioned 2 main groups and further to approval by the relevant national authorities, draw up type-specific inspection specifications.

The EU and German exhaust emissions directives also contain, in addition to the scopes of inspection and inspection procedures and the maximum permitted exhaust gas limit values, further specifications for the test equipment (type approval, calibration) and the test environment such as e.g. for authorised inspectors, equipment at the inspection site, etc.

2. Germany:

In Germany the special exhaust emissions test ("Abgas-Sonder-Untersuchung" - ASU) had already been introduced on 01.04.1985 for passenger cars with petrol engines without closed-loop-controlled exhaust gas aftertreatment systems, i.e. vehicles as from model year 1968.

From 01.12.1993 this periodic exhaust emissions test was extended under the name "Abgasuntersuchung"



(AU) (exhaust emissions test) to all passenger cars, i.e. also petrol vehicles with closed-loop-controlled exhaust gas reduction systems ("U-Kat" or "G-Kat") and all vehicles with diesel engines (passenger cars, commercial vehicles and buses). From 01.04.2006 motorcycles as from model year 1980 were also incorporated into the exhaust emissions test.

The statutory basis for this is provided by §29 and §47a and b of the German road traffic licensing regulations (StVZO). From 01.04.2006 the hitherto separate exhaust emissions test became an integral part of the technical motor vehicle inspection (§29), but may also continue to be carried out as a separate element by recognised workshops.

Vehicles concerned: BMW vehicles: Petrol engine as from model year 1968; with diesel fuel as from MY 1983

MINI as from R50 and Rolls-Royce as from RR01

Procedure: 1. In the performance of the exhaust emissions test required by law, which constitutes an sovereign act, the EU- and the **country-specific administrative regulations** must be observed.

2. The **technical details for the scope of inspection** and type-specific particulars are to be obtained from the Service Information bulletins listed below:

- Emissions test instructions for BMW Group vehicles with petrol engines
- Emissions test instructions for BMW Group vehicles with diesel engines
- Emissions test instructions for BMW Group vehicles with alternative drives

3. Furthermore, primarily the manufacturer- and type-specific specified values, or if these are not available, the statutory maximum limit values must be applied to the exhaust emissions test. These specified values, which in part also contain setting instructions, are set out specifically for each type in the **collection of BMW emissions test nominal values**.

Notes:

These emissions test nominal values are called up, depending on the user, via the Intranet or Extranet of the BMW Aftersales Portal or for "third-party users", via the Internet from the BMW web portal Technical Parts Information System: "ASAP", module - emissions test nominal values, at the web addresses:

<http://www.parts.bmwgroup.com>

or

<http://www.aftersales.bmwgroup>

These emissions test nominal values are for the most part - also in the course of the next due maintenance on the BMW emission testers - loaded by the BMW-approved equipment manufacturers into the test equipment memories.

Moreover, these data can also be obtained from the data catalogues of the open-market repair data publishers (e.g. DAT, Eurotax, Autodata, etc.) once their publications have been updated.

The current database contains the nominal data for all vehicles of the BMW Group as well as MINI and Rolls-Royce, i.e. produced between 1968 and 03-2012. Updates are usually issued in April and October every year.

Remarks:

If you find that vehicles are either not listed in this database, or that a listing is incomplete or faulty, you are advised to:

- copy the reply sheet attached in Enclosure 1 of this Service Information bulletin,
- get the testing personnel to complete/correct it
- if necessary, send together with a copy of the vehicle's official registration papers or of the printout of the nominal values to BMW AG Central Service - Repair Information, Dept. UA-72 by fax (no.: +49 89 382 4 17



88) or by e-mail to the address **AU-Soll-Daten@bmw.de**.

We will then amend or correct accordingly in the next update.

4. Officially specified test categories:

EU-wide and covering all engine designs:

- **Vehicle identification** (number/license plate, km reading/mileage and vehicle identification number)
- **Visual inspection** of all exhaust-relevant components for existence, absence of change and damage; on vehicles with exhaust on-board diagnosis (EOBD): check of exhaust-relevant fault entries
- **Setting checks** (idle speed and increased idle speed, if necessary ignition; diesel fuel: maximum speed)
- **Effective check by means of exhaust tailpipe measurement on:**

Petrol engines:

- without catalytic converter: CO at idle;
- with closed-loop-controlled catalytic converter: CO, lambda

Diesel engines:

- Exhaust gas opacity when revving the engine from idle up to maximum speed (no load)
- **Documentation of the test results and their evaluation** (not OK or OK)

5. There are also **regulations for type approval and regular calibration of emission testers**. A wide range of emission testers is tested and recommended by BMW in the interests of complying with its own service conditions (integration in BMW workshop network, flat rate units, adaptation to BMW vehicles, etc.) and published in the Workshop Equipment and Planning Catalogue (WEP).



Fig.: Examples of BMW-recommended emission testers.

6. Additional legal requirements in Germany:

The exhaust emissions test must be carried out with PC-based “**operator prompting**” installed in the emission testers. This signifies a legally required test sequence and the associated automatic recording of the test components. This is intended to eliminate the risk of tampering to the greatest possible extent.

For the purpose of certification the testing personnel must attend an initial training course and then a refresher training course every 3 years.



Workshops that carry out the exhaust emissions test must be certified by the state authorities or on behalf of them by the automotive trade guide with regard to the safety, suitability and completeness of the emissions test equipment.

Since 2006 it has been required for the emissions test results, equipment maintenance and training courses to be centrally recorded within the framework of a quality system.

7. General – covering all engine designs

Exhaust emissions test on vehicles with automatic transmissions

Vehicles with automatic transmissions may suffer failure of their multidisc clutches during exhaust emissions test if the test steps take up too much time at higher engine speeds.

This concerns in diesel engines primarily the checking of the “maximum speed at no load” if it takes longer than 1.5 seconds and in petrol-engine vehicles with oxygen sensor emissions control (closed-loop-controlled catalytic converter) if the conditioning phase of 3 minutes is applied at $n \Rightarrow 3000$ rpm.

This damage is caused by the high pressure in the hydraulic fluid circuit at engine speeds above approx. 2500 rpm, which results in a pressurisation of the clutch discs by way of leaks due to operation or wear. The linings of these clutches are subject to increased wear with the selector lever in position “P” or “N” and the output shaft or rear wheels stationary.

Effect: Primarily in the ZF type 4HP22 automatic transmission under the currently specified test conditions the disc set of the “A” clutch may be detrimentally affected to such an extent that forward travel is no longer possible after the exhaust emissions test has been completed.

Measure: With the vehicle stopped (selector lever in position “P”) and with the ZF 4HP22 automatic transmission the following operating points (engine speed/time) must not be exceeded:

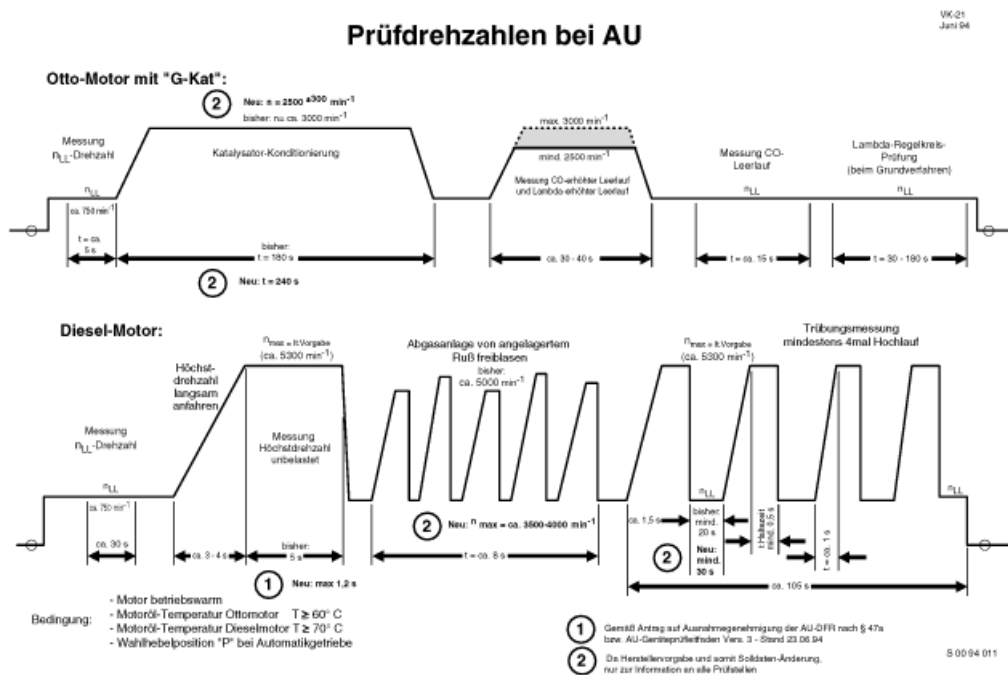
nengine = 2500 rpm --> max. 15 minutes

nengine = 3000 rpm --> max. 60 seconds

nengine = 5000 rpm --> max. 1.2 seconds

In the case of other automatic transmissions, the dwell time at higher engine speeds

(> 3000 rpm) must be limited to the absolutely necessary level.



Master document for vehicle-specific Service Information bulletins

All model series up to Model Year 2004

Situation: The constantly increasing range of different models has now grown to a degree that makes it logical to allow vehicle-specific data to be called up concisely from a single document.

Procedure: Call up publications concerning vehicle-specific data via the following hotspots:

Service Information bulletins, ordered by year of publication:

<u>Year of publication</u>	<u>Title</u>	<u>Affected model series</u>
1995	Sealing rings for expansion tank	E36 M50, M52 with ASC+T
1995	Overview 1996	E31, E34, E36, E38, E39
1995	Natural-gas-driven vehicles (CNG)	316 g, 518 g
1997	Chip tuning on diesel engines	M41, M51, M47, M57, M67
1997	Support tower in oil-filter housing	E31, E32, E34, E38 M60/1, M60/2, M70, M73
2000	Transpack	E52, E53
2001	Emissions test, alternative procedure	BMW, MINI EUR only
2001	Checking V-belt ribs	E53 M54, M57, M62
2001	Towing characteristics E65	E65
2002	Oil filter change	R50, R53
2002	Transport mode	E39, E46, E53, E65, E66
2002	Diesel flushing agent discontinued	M47, M47TU, M57, M57TU, M67, M41, M51, M21 Not USA, Canada
2002	Transmission damage during emissions test	BMW with automatic transmission EUR only



2002	Cleaning painted hardtop mounting surface	E52
2002	Checking the electro-mechanical parking brake during periodic vehicle inspection	E65, E66, E67
2002	Body protection film	R50, R53 Not United Kingdom
2003	Testing of four-wheel drive vehicles using brake test and performance test stands	E30, E34, E46, E53, E83
2003	Airbag: Repair Instructions for belt tensioner and/or side airbag triggering circuit	E36, E36/7, E38, E39, E46, E53, R50, R53
2003	Towing	E53, E83



Master document for workshop literature/workshop equipment

All series until model year 2004

Situation: The constantly growing range of different models has now grown to a degree that makes it logical to allow data relevant to workshop literature/workshop equipment to be called up concisely from a single document.

Procedure: Call up publications concerning workshop literature/workshop equipment data from the following hotspots:

Service Information bulletins, ordered by year of publication:

<u>Year of publication</u>	<u>Title</u>	<u>Affected model series</u>
1996	Check accessories kit	BMW
1997	Handling special damaged components	BMW, MINI Germany only
1998	CBT Manager, software update of the SIP management program	BMW, MINI
1998	MoDiC 3 diagnostic head update	BMW, MINI
1999	Deletion of microfiches	BMW
1999	Remote operation using MoDiC 3	BMW, MINI
1999	Accelerated delivery of CDs	BMW, MINI
1999	New delivery address for CD recycling	BMW, MINI
1999	Rescue manual	BMW, MINI
2000	Handling "Q-I components"	BMW, MINI Germany only
2000	Technical Information for authorised third parties	BMW, MINI Europe only
2001	TIS Hotline	BMW, MINI
2002	KSD CD 05/2002	BMW



2002	Online publication of type approval numbers for original BMW brake pads	BMW from E36/7, MINI Excluding USA, C
2004	Support Service for GT1	BMW, MINI



Supplement for target exhaust emission data from 04/2007 to 03/2009 Test procedure for lean-mix petrol engines. Amended test procedure and flat rate units for exhaust emission inspection on vehicles as from initial registration (EZ) 01.01.2006 or test procedure according to Exhaust Emission Guidelines No. 4

1 / E81 - E87; 3 / E90-E93; 5 / E60 - E61; 6 / E63 and E64; X3 / E83; X5 / E70, X6 / E71, Z4 / E85 and E86, MINI / R55, R56

Situation: 1. Type-specific target data for the exhaust emission inspection have been compiled for BMW models introduced in the period from 04/2007 to 03/2009. Changes/additions have in part been made to data records already published for earlier vehicles.

2. German legislation has adapted the testing procedure for all vehicles as from initial registration (EZ) 01.01.2006 to the technical advancement of these vehicles, e.g. EURO-4. This means only the OBD data need to be read and evaluated as part of the exhaust emission inspection. An exhaust emission measurement is to be additionally carried out only in rare cases where not all OBD readiness tests return a positive result, e.g. after clearing fault code memory.

For this purpose, the exhaust emission operator prompting has been adapted to the Exhaust Emission Guideline No. 4 which is compulsory for these vehicles as from 01.12.2008.

3. The flat rate units have also changed in line with the amended test procedure.

Affected vehicles: BMW and MINI petrol and diesel engine vehicles, initial registration from 04/2006 to 03/2009

E81-E87, E90-E93, E60-E61, E63-E64, E70-E71, E83, E85-E86. E65 and F01, F02. MINI / R55, R56

Procedure: 1. The newly compiled or revised, indices manufacturer's data (target exhaust emission inspection data) are to be used while conducting the exhaust emission inspection on the indices BMW or MINI vehicles.

Note:

These data will be loaded in the tester menu by the BMW-approved tester manufacturer: AVL and MAHA as part of the next maintenance procedure on the BMW exhaust emission testers.

Since introducing the exclusive online provision data -user-dependent-, these data can be retrieved on the Intranet, Internet or Extranet from the BMW Web-Portal, Technical Parts Information System: ASAP", module - exhaust emission target data, under the web addresses:

<http://www.parts.bmwgroup.com>

or

<http://www.aftersales.bmwgroup.com>

Moreover, these data can also be obtained from the data catalogues of the open-market repair data publishers (e.g. DAT, Eurotax, Autodata, etc.) once their publications have been updated.

Note:

If you find that vehicles are either not listed, or that a listing is incomplete or faulty, you are advised to:

- copy the Reply forms provided in Enclosure 1 to this SI
- get the testing personnel to complete/correct it
- if necessary, send by fax to BMW's Central Service - Repair Information, Dept. VS-35 together with a copy of the car's official registration papers or of the printout of the nominal values. (fax No.: 089 -382-4 17 88)

We will then correct accordingly in the next update.

2. Using the new test procedure conforming to Guideline 4:

A. Reading and evaluation of OBD data.

- If the status of the function indicator lamp is "MIL-Off",
- there are no fault codes in Mode 3 **and**
- and if all available test readiness codes are set positive, the exhaust emission inspection is passed and can be concluded with a printout of the test certificate or test verification.



The exhaust emission inspection is not passed at MIL-On or if fault codes are set.

B. Supplementary exhaust emission measurement:

If not **all** available test readiness codes are set to positive, e.g. after previously clearing the fault code memory, the previously standard exhaust emission measurement must be **additionally** carried out.

Petrol engines:

- Determining CO content at idle speed and elevated idle speed*
- Lambda at elevated idle speed*
- Carrying out Lambda_Regelkreis test by means of substitute procedure, i.e. measuring the oxygen sensor current with the generic scan tool*

Diesel engines:

- Measurement of idle speed and maximum engine speed*
- Measurement of exhaust gas opacity*

*= see type-specific exhaust emission target data

Note:

The following deviations in the additional exhaust emission measurement that may be necessary apply to BMW vehicles with lean-mix petrol engines such as the N43 and N53 that are equipped with a DeNOx storage catalytic converter:

Lambda: 0.97 **-2.30**

Current of lambda control sensors: -0.115 - **+1.325 mA**

The exhaust emission measurement must be repeated if regeneration of the DeNOx storage catalytic converter, which takes max. 10 sec and leads to lambda values substantially lower than 0.97 or CO values higher than 3 vol.-%, is initiated by the DME control unit during the exhaust emission measurement.

3. New flat rate units for the exhaust emission inspection **for vehicles with first registration** as from **01.01.2006**:

		<u>Petrol engines:</u>	<u>Diesel engines</u>
<u>00 00 128</u>	<u>§ Exhaust emission inspection only with OBD data</u>	<u>3 FRUs</u>	<u>3 FRUs</u>
<u>00 00 528</u>	<u>§ Exhaust emission inspection only with OBD (for inspection)</u>	<u>1 FRU</u>	<u>1 FRU</u>
<u>00 00 850</u>	<u>Supplementary exhaust emission measurement</u>	<u>2 FRUs</u>	<u>2 FRUs</u>

The previous FRUs are to be used for vehicles built before initial registration date 01.01.2006, i.e. general implementation of exhaust emission measurement.

Where applicable, other requirements relating to the exhaust emission inspection stipulated by national authorities which do not permit the use of manufacturer or type-specific data must be observed.



Supplement for target exhaust emissions inspection data of BMW and MINI vehicles from 04/2009. Modified test specifications for petrol lean-mixture engines N43 and N53. Test procedure for hybrid vehicles

1 / E81 - E87; 3 / E90-E93; 5 / F10 - F11, F18; GT5 / F07; X1 / E84; X3 / F25; X5 / E70, X6 / E71 - E72, Z4 / E89; MINI / R55 - R57, R60;

Situation: The type-specific target exhaust emissions inspection data has been issued for the BMW models introduced from 04 / 2009. Changes/additions have in part been made to data records already published for earlier vehicles, in particular with N43 lean-mixture

N53 engines.

Vehicles concerned: BMW and MINI petrol and diesel-engine cars, first registration from 04/2009

E81-E89, E90-E93, E70-E72, F01-F07, F10 – F18; F25; MINI / R55 - R57, R60; Rolls-Royce RR04;

Procedure: 1. The newly compiled or revised type-specific manufacturer data (target exhaust emission inspection data) are to be used while conducting the exhaust-gas test on the BMW or MINI vehicles.

Note:

This data will be loaded for next maintenance in the tester menu by the BMW approved equipment manufacturer: AVL and MAHA as part of the next maintenance procedure on the BMW exhaust emission testers.

Since introducing the exclusive online provision data -user-dependent-, these data can be retrieved on the Intranet, Internet or Extranet from the BMW web portal, Technical Parts Information System: ASAP", module - emissions test nominal values, under the web addresses:

<http://www.parts.bmwgroup.com>

or

<http://www.aftersales.bmwgroup.com>

Moreover, these data can also be obtained from the data catalogues of the open-market repair data publishers (e.g. DAT, Eurotax, Autodata, etc.) once their publications have been updated.

Note:

If you find that vehicles are either not listed, or that a listing is incomplete or faulty, you are advised to:

- copy the Reply forms provided in the enclosure to this SI
- get the testing personnel to complete/correct it
- if necessary, send by fax to BMW AG Central Service - Repair Information, Dept. VH-54 together with a copy of the vehicle's official registration papers or of the printout of the nominal values. (fax No.: +49 89 382 4 17 88).

We will then correct accordingly in the next update.

2. Change of speed and lambda sensor specifications for lean mixture engines N43 and N53

2.1 Lambda sensor change for N43 and N53:

If necessary in the case of the additional exhaust test on the end pipe, if the readiness codes of the OBD are not positively set or are incomplete, the following lambda sensor values apply for BMW vehicles with petrol lean-mixture engines such as N 43 and N 53 for idle speed and increased idle speed:

0,7 - 4,0

Relevant current value range of the lambda control sensors:

- 1.60 to + 1.82 mA.

The exhaust emission measurement must be repeated if regeneration of the NOx catalyst storage converter, which takes max. 10 sec and leads to air ratios substantially lower than 0.97 or CO values higher than 3 vol.-%, is initiated by the DME control unit during the exhaust emission measurement.

2.2 Behaviour of the "increased" idle speed only for N43:

The engine control system MSD80 and MSD81 contains a time- and speed-dependent component protection



function to avoid thermal damage to the N43 engines.

This means that for a stationary vehicle ($v = 0$ km/h) and acceleration, e.g. to bring the engine to the operating temperature quicker, after 150 seconds the increased idle speed is limited to a max. 2000 rpm. At the same time the engine warning light (EML) is controlled and a fault code (0x2F91) entered in the shadow memory (ScanTool-Mode 7).

For the performance of the emissions measurement in the legally required test step CO and lambda sensor measurement at increased idle speed, this means:

- To achieve the operating temperature the engine cannot be operated in a stationary position at an engine speed greater than 1900 rpm.
- Then the test step "CO and lambda sensor measurement at increased idle speed", according to BMW specification 2300 – 2700 rpm, can be performed **within a max. 150 seconds**.

3. Exhaust emissions inspection for BMW hybrid vehicles BMW 7-series Active Hybrid (F04) and BMW X6 Active Hybrid (E72).

The exhaust emissions must be inspected according to the two-stage test procedure valid for vehicles from 01.01.2006:

1. Reading and evaluation of OBD data

MIL function; P codes in Mode 3; status of the readiness codes (RC)

If all vehicle-specific relevant readiness codes (RCs) are not positively set, i.e. the OBD system is not ready for testing, then the next step must also be performed.

2. Exhaust gas end pipe inspection with the following test criteria:

- Petrol engine with G-cat:
 - CO in idle state > max. 0.3 Vol-%
 - CO increased idle state > max. 0.2 Vol-%
 - Lambda 0.97-1.03 in increased idle state ($n = 2300 - 2700$ rpm)
 - Closed loop test i.a.w. replacement procedure: i.e. current measurement of the lambda control sensors as per manufacturer specifications in idle state.
- Diesel engine:
 - Check the idle state and maximum speed with no load; values as per manufacturer specifications
 - Smoke density at free acceleration: K value according to manufacturer specifications or for vehicles with controlled particulate filter (PM-5) max. 0.5 m-1

Special features: Operation of the combustion engine at $V = 0$ km/h. Perform exhaust emissions inspection if step 2 = emission measurement required:

1. **For the BMW 7-Series Active Hybrid** the combustion engine can be operated in a stationary state without additional intervention due to the mild hybrid concept.
2. **For the BMW X6 Active Hybrid** on account of the full hybrid concept: "Start-up generally in electric motor mode" the following steps must be performed for the operation of the combustion engine in a stationary state:
 - I. Required operating mode: "Detection of driver present"; i.e. driver's door must be open and driver's seat belt not used!
 - II. Engine start by pressing Start button
 - III. Gearbox selector lever in position N!
 - IV. Gas pedal for idle state emission measurement not activated. Note: Depending on the state of charge of the high-voltage battery (HV) an increased load can be effected for the battery charge also in idle operation.
 - V. Press the gas pedal for increased idle state measurement at $n_{\text{mot}} = 2300 - 2700$ rpm and hold for prescribed measurement period (30 sec).

Where applicable, other specifications relating to the exhaust-gas test stipulated by national authorities which do not permit the use of manufacturer or type-specific exhaust emissions data must be observed.



Test instructions for the exhaust gas test (AU) on BMW vehicles with diesel engines from European emission classification "EURO 6"

BMW and MINI diesel vehicles with exhaust emission stage "EURO 6" and from vehicles: EU exhaust gas code "W" or German emission key number "36W0". Depending on the model introduced from production 07/2014.

Situation: 1. The European parliament and the EU Council have adopted new test specifications for periodic vehicle inspection with the **guideline 2014/45/EU** in April 2014. Objective was to implement new findings in traffic conditions and to adapt the test according to the technical state of the vehicles.

The implementation regulations according to Enclosure I, section 8.2.2.2 of this guideline allow the exhaust emission behaviour for vehicles from EURO 6 to be classified by reading/evaluating the on-board diagnosis data (OBD) **and associated vehicle manufacturer's specifications**.

The BMW/MINI vehicles from the exhaust emission stage "EURO 6_Klasse W" contain extended and stringent OBD test criteria and are, thus, as a rule to be checked by evaluating the OBD data and observing the additional manufacturer's instructions. This test method corresponds to the state of the technology installed in these vehicles.

2. The German Department of Transport, in September 2014 by publishing the "**Guideline for the implementation of the exhaust gas test**", has adopted the minimum requirements of the above-mentioned EU Directive and has modified them slightly according to the field experiences in Germany. The previous procedure, for all vehicles from first registration 01.01.2006, that is, from exhaust emission stage EURO 4, the two-stage procedure is retained for the time being:

Stage 1: Reading and evaluation of OBD data;

Stage 2: If not **all** readiness codes are set to positive, then in addition an exhaust tailpipe measurement has to be carried out, in this case opacity measurement, under free acceleration and evaluation of the "Official sticker value" using certified exhaust emission devices. This applies until further notice even for EURO 6 vehicles until renewed findings equivalent to "OBD vs.. Exhaust gas measurement" are available.

Vehicles concerned: BMW and MINI diesel vehicles with exhaust emission stage "**EURO 6**" and from vehicles: **EU exhaust gas code "W"** or German emission key number "**36W0**". Depending on the model introduced from production 07/2014.

Procedure: Official test scopes

1. EU wide test scopes (without Germany):

- Vehicle and vehicle documents match;
- Recording vehicle data for verification certificate;

1.2 Exhaust gas classification test:

Check whether the vehicle corresponds to the exhaust emission stage/code "EURO 6 W" or "36W0". To do this, read out corresponding data from the certificate of acceptance part 1 (vehicle registration papers) in line 14 or in field 14.1.

1.3 Check by reading and evaluating the OBD data:

Connect one of a Generic ScanTool corresponding to the current OBD standards on the vehicle diagnosis interface. (Use ScanTools with printer output only.)

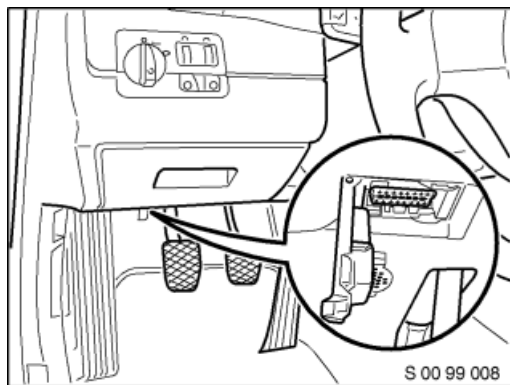
1.3.1 Functional test of the interface connecting ScanTool to the EOBD of the drive-control units

Display: **Type of the OBD report and the number of emission-relevant control units**

• See Enclosure 4: Graphics of all ScanTool modes and services



- See Enclosure 1: Graphics of all ScanTool modes or services
- Please refer to Enclosure 2: ScanTool read out and results to diesel vehicle



OBD diagnosis connection in the vehicle

1.3.2 Malfunction indicator lamp check (MIL = malfunction indicator lamp)

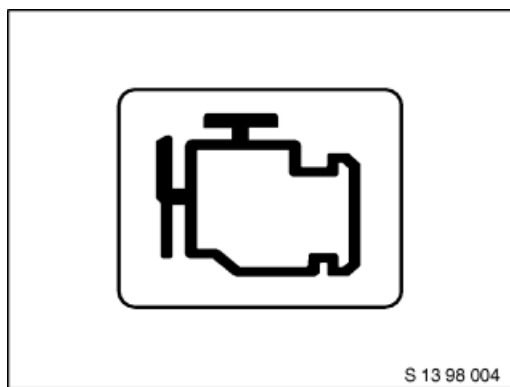


Figure of the malfunction indicator lamp (MIL)

- **Visual inspection of the function of malfunction indicator lamp (MIL)**
 - Ignition on – engine off - MIL lit = OK
 - Ignition on – engine off - MIL not lit = not OK
 - Ignition on – engine running - MIL off = OK
 - Ignition on – engine running - MIL lit = not OK
- **Reading the status of the MIL from the ScanTool in Mode 1-**
 - If the ScanTool output is "MIL Off": = OK
 - If the ScanTool output is "MIL On": = not OK

1.3.3 Status and evaluation of OBD readiness test (Readiness codes) in the ScanTool mode 1

Read out and evaluate individual readiness test codes in the two OBD categories:

- **Group B: Continuous monitoring**
- **Group C: Non-continuous monitoring**

Note: In the ScanTool, following selection is necessarily applicable:

"Delete readiness test for fault code"!

Here, the Readiness tests from several driving cycles are displayed and the probability is highest that all supported RCs are set to positive. When selecting "Readiness test of this cycle", the supported RCs are usually not set to positive.

Generally, immediately before the exhaust-gas test without a wilful occasion, for example, if no drivability complaints have been made by the customers, **the fault memory should not be deleted**, because this will also delete all readiness test codes, in addition to the error codes.

Only within the scope of service review or for customer complaints, the fault memory should be viewed in mode 3 with regard to possible repeatedly confirmed errors shortly before the exhaust-gas test. If errors exist



that would lead to a failure of the exhaust-gas test, carry out a repair and then delete the fault memory. Then 2-3 driving cycles* should be carried out in which the readiness of the individual systems can be reset.

* = Engine start, acceleration phases, constant-speed driving, overrun phase, idle operation and stopping the engine

Readiness tests (Readiness codes) Diesel engine

<u>Continuous monitoring</u>	<u>Non-continuous monitoring</u>
- Byte B data -	- Byte C data -
0 misfire	0 NMHC catalytic converter
1 Fuel system	1 Nitrogen oxide catalytic converter/SCR system
2 Components	2 -Free-
3 -Free- (if necessary O/D monitoring)	3 Charging pressure
	4 -Free- (if necessary air conditioning)
	5 Exhaust gas sensor
	6 Particulate filter
	7 Exhaust gas recirculation system

Table: Designations of the Readiness Codes

Manufacturer's specifications for Readiness Code - Evaluation:

In the group B "continuous Überwachung_Data byte B", all parametrised and supported RCs must be set to **positive**. that is, the electrical check of the sensors/actuators has lapsed in all functions; to do this usually a 1-2 minute engine operation in idle position is sufficient. **If one of these RCs is not set to positive even when the engine is running** (also referred to as "test not carried out"), **then the exhaust-gas test shall be evaluated as failed.**

In the Group C, "non-continuous Überwachung_Data byte C" all, but at least 4, parametrised or supported RCs should be checked to be **positive**. Few "long-time needed" RCs cannot yet be set to **positive!** (also referred to as "test not carried out").

Reason: Their fault set conditions require a longer journey with different load conditions, speeds and specific atmospheric conditions after fault memory deletion.

For BMW and MINI diesel fuel engines from exhaust emission stage EURO 6, the following 3 RCs: Nitrogen oxide/SCR system, particle filter, exhaust gas sensor may be exempted from RC evaluation, that is, not yet set to positive or Display bit 1.

Note:

The set result by a binary indication of the individual RCs is:

- 0 = checked at least once or diagnosis not supported
- 1 = Components displayed as not yet fully checked. The figure below shows the

Evaluation matrix:

Readiness Codes

Continuous testing_ Byte B data- Data: Petrol and diesel-engine vehicles

Bit		Supported/bit	Test carried out/ bit	Permissible bit values of the performed RCs for the exhaust-gas test evaluation at OK or passed



0	Misfire	Yes = 0 / No = 1	Yes = 0 / No = 1	0
1	Fuel system	Yes = 0 / No = 1	Yes = 0 / No = 1	0
2	General components	Yes = 0 / No = 1	Yes = 0 / No = 1	0
3	Free- (if necessary O-D monitoring)	Yes = 0 / No = 1	Yes = 0 / No = 1	0 if implied; Otherwise even 1

Non-continuous tests _ Data byte C/D data: Only **diesel vehicles**

Bit				
0	NMHC catalytic converter	Yes = 0 / No = 1	Yes = 0 / No = 1	0
1	Nitrogen oxide catalytic converter/SCR system	Yes = 0 / No = 1	Yes = 0 / No = 1	0 or 1
2	free	Yes = 0 / No = 1	Yes = 0 / No = 1	0
3	Charging pressure	Yes = 0 / No = 1	Yes = 0 / No = 1	0
4	Free- (if necessary air conditioning)	Yes = 0 / No = 1	Yes = 0 / No = 1	0 or 1
5	Exhaust gas sensor	Yes = 0 / No = 1	Yes = 0 / No = 1	0 or 1
6	Diesel particulate filter	Yes = 0 / No = 1	Yes = 0 / No = 1	0 or 1
7	Exhaust gas recirculation system	Yes = 0 / No = 1	Yes = 0 / No = 1	0

Graphic: Evaluation matrix of the readiness test bits

1.4 Record status of the fault memory in ScanTool mode 3*

(* = Mode 3 means storage of errors which have been confirmed over multiple driving cycles).

- If standardised **Powertrain codes**, for example, P0 xyz, P2 uvw or manufacturer-specific Powertrain codes, e.g P1 xyz, P3 uvw, **are stored**: Test = not OK
- If no **Powertrain codes** are stored: Test = OK

1.5 Identity check of the chassis number (VIN) according to the comparison via ScanTool Mode 9:

Read out chassis number (VIN = Vehicle Identification Number) from ScanTool Mode 9 and compare it with the vehicle type plate:

If the VINs deviate from each other: Test = not OK

1.6 OBD final evaluation:

If the:

- MIL - function check and MIL - status are OK,
- the RC evaluation, taking into account "long-time RCs" not relevant to the set, is positive
- no errors are stored in mode 3,
- the VIN comparison: Vehicle to ScanTool -Mode 9- information is identical,

then the exhaust-gas test is to be concluded as "passed".

If one of the aforementioned points is not OK, the exhaust-gas test via OBD is considered failed.

The OBD data MIL and RC status from Mode 1; Error codes from Mode 3 and VIN from Mode 9 are to be printed on the verification certificate.



Note: If data communication is not possible in the event of several connection attempts between the ScanTool and the vehicle-side interface (OBD socket), the emissions test is classed as “not passed” and the vehicle is to be repaired.

2. Test scopes for exhaust-gas test on EURO 6 diesel vehicles in Germany:

In Germany, at present, the two-stage test procedure for all vehicles of categories M (passenger cars) and N (trucks) from the date of first registration 01.01.2006* is applicable even for EURO 6 vehicles with obligatory exhaust-gas test operator prompting. (* = from EURO 4 / IV) In addition, the exhaust-gas test may be performed on these vehicles from **01.06.2015** only with the operator prompting according to "Exhaust-gas test - devices user guide 5".

2.1. Level 1 = OBD - check:

Read out and evaluate the OBD data, as described in section 1.1 - 1.6, but with the following changes:

- **Section 1.2 Exhaust emission classification check on EURO 6 omitted** because all vehicles from first registration 01.01.2006 (from EURO 4) are primarily checked via the OBD.
- **In section 1.3.3, all continuous and all non-continuous supported readiness codes must be set to positive (bit = 0).**
- **If the readiness codes of the OBD system operated by the engine control unit are not or not completely set to positive**, that is, the OBD system itself is not yet ready for testing, for example, because the fault memory was deleted shortly before, **an opacity measurement must additionally be carried out according to Section 2.2.**

2.2. Level 2 = Exhaust gas opacity measurement as additional check under the following precondition:

Note: The following procedure generally also applies to all diesel vehicles before the first registration 01.01.2006. See also the BMW Service Information "Test instructions for the exhaust-gas test on BMW vehicles with diesel engines" from 04/2012.

2.2.1 Visual inspection of emission-relevant components:

Note: This test step will be deleted from the new version of §29_StVZO in accordance with 47th amendment regulation as from 01.07.2012, as the visual inspection is an integral part of the technical vehicle inspection and thus the same components are not inspected twice.

2.2.2 Setting check: Idle position and maximum speed unloaded according to the manufacturer's specification. See also BMW exhaust-gas test nominal data.

2.2.3 Effective check:

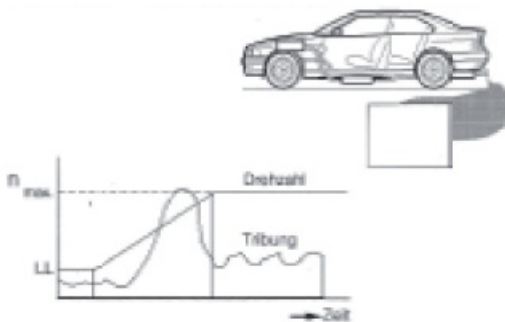
Determining the exhaust gas opacity at the exhaust system tailpipe during “free acceleration” at operating temperature, i.e. with engine oil temperature at minimum 60 °C with selector lever position in “Neutral”. Free acceleration is defined as revving the engine from idle up to maximum speed at no load in response to a swift opening of the throttle. The accelerator pedal must be depressed quickly and continuously within max. 1 second from the idle stop to the full load stop. To determine the actual opacity state (opacity coefficient k in m^{-1}), it is necessary to create the arithmetical mean from three engine start-ups. If the opacity value of 1st engine start-up is at least 30 % below the limit value, further start-ups can be omitted.

Caution!

In few cases, under certain circumstances, it could lead to a state where the DME activates an engine speed limitation to 2000 rpm for the reason of component protection. After the terminal change, this protective function is automatically deactivated again.

Graphic: Opacity characteristic during engine start-up = free acceleration

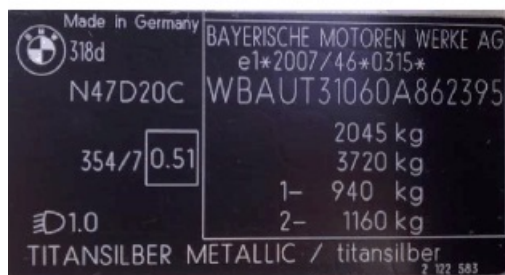




2.2.4 Opacity limit values:

For **all** diesel vehicles, since the publication of the German Implementing Directive only the "**Sticker value**" indicated on the vehicle type plate applies according to EU Directive 72/306/EEC.

BMW type plate with "sticker value" 0.51 in the small rectangle



If sticker value is not available or cannot be used on technical grounds, the following applies:

- for vehicles which were brought in the market for the first time before 1 October 2006: maximum 2.5 m-1, based on measuring mode B;
- for vehicles which were brought in the market for the first time from 1 October 2006 and before 1 September 2015: maximum 1.5 m-1, based on measuring mode B;
- for vehicles from emission key 36xx or 66xx: (= EURO 6) maximum 0.5 m-1, based on measurement mode B.

Note: In Germany it is possible to select the mode for determining the opacity coefficient, i.e. its measuring circuit time constant, in the emission tester:

- Mode A: = "unfiltered", i.e. < 0.050 sec
- Mode B: = "filtered", i.e. 0.90 – 1.10 sec

Generally mode B is to be used for BMW vehicles throughout the EU and in Germany in line with EU Directive 72/306/EEC.

General notes:

The manufacturing stage emissions test nominal values, for example, engine speed ranges; opacity threshold values are shown in the **BMW emissions test nominal data acquisition** related to the type.

These emissions test nominal values are called up, depending on the user, via the Intranet or Extranet of the BMW Aftersales Portal and for "third-party users", via the Internet from the BMW web portal Technical Parts information system: ASAP", module - emissions test nominal values

at the web addresses: <http://www.parts.bmwgroup.com>

Updates are usually issued in April and October every year.



Moreover, these data can also be obtained from the data catalogues of the open-market repair data publishers (e.g. DAT, Eurotax, Autodata, etc.) once their publications have been updated.

Incidentally, in Germany, the new "Guidelines for conducting exhaust gas test on vehicles according to Section 6.8.2 of Enclosure VIIIa German road traffic licensing regulations (StVZO) from 30.09.2014" are applicable.

Country-specific specifications of other countries must be given priority in any case to this SI specifications.

Enclosure 1 "ScanTool services"

Reading and display functions of the OBD - Generic ScanTools

	Select scan tool connected to OBD functions interface	
	Detect the EOBD or US OBD-2 diagnosis report	Example: Society of Automotive Engineers J 1850, International Organization for Standardisation 9141-2, International Organization for Standardisation 14230-4 (= Key Word Protocol-2000 Fast), International Organization for Standardisation 15765-4 (= CAN);
Service 01	Malfunction indicator lamp status; Readiness code; Number of stored errors; call-up of current engine data (e.g.: n-mot; temperatures; load conditions etc.)	Listing of all supported systems/functions;
Service 02	Calling-up "Freeze Frame" data to stored error codes, for example, to P0 100:for n = 1,200 revolutions per minute; Tw = 22°C; Partial load= 10%, v = 0 km/h, etc.	Marginal conditions in which error codes were set
Service 03	Calling-up all set error codes. g. P0100 "Air flow circuit malfunction"	<u>Listing of all fault codes that make the malfunction indicator lamp light up ; faults that are confirmed over multiple driving cycles</u>
Service 04	Deleting the OBD error codes, Freeze Frame and all other data	Only permissible for test purposes after repair or if renewed driving cycle occurs
Service 05	Monitoring of oxygen sensors, for example, sensor 1: 0.35 <--> 0.87 volts	Checking the current control voltage - <u>Engine must be running</u>
Service 06	Call-up of the shadow fault memory, e. g. P0410 "Secondary air feed malfunction"	Not continuously monitored functions, for example, only 1 x after each engine start
Service 07	Call-up of the shadow fault memory, for example, P0133 oxygen sensor 1 = slow response	Continuous monitoring; fault codes stored here must not yet lead to the lighting up of malfunction indicator lamp
Service 08	System or components, for example, valve actuation for fuel tank ventilation system	Only required for in-depth diagnosis steps in Service
Service 09	<u>Vehicle identification (chassis number control units number; mileage with malfunction indicator lamp ON)</u>	for example, for documentation; as well as data for official field monitoring
Service \$0A	Display permanent error codes	for example, non-deletable NOx codes



Test instructions for the exhaust gas test (AU) on BMW vehicles with petrol engines from European emission classification "EURO 6"

BMW, BMW i, BMW M, MINI and Rolls Royce petrol engine vehicles with exhaust emission stage "EURO 6" and from EU-exhaust gas-code "W", or German emission key number "36W0". Depending on the model introduced from production 07/2014.

Situation: 1. The European parliament and the EU Council have adopted new test specifications for periodic vehicle inspection with the **guideline 2014/45/EU** in April 2014. Objective was to implement new findings in traffic conditions and to adapt the test according to the technical state of the vehicles.

The implementation regulations according to Enclosure I, section 8.2.2.2 of this guideline allow the exhaust emission behaviour for vehicles from EURO 6 to be classified by reading/evaluating the on-board diagnosis data (OBD) **and associated vehicle manufacturer's specifications**.

The BMW/MINI vehicles from the exhaust emission stage "EURO 6_Klasse W" contain extended and stringent OBD test criteria and are, thus, as a rule to be checked by evaluating the OBD data and observing the additional manufacturer's instructions. This test method corresponds to the state of the technology installed in these vehicles.

2. The German Department of Transport, in September 2014 by publishing the "**Guideline for the implementation of the exhaust gas test**", has adopted the minimum requirements of the above-mentioned EU Directive and has modified them slightly according to the field experiences in Germany. The previous procedure, for all vehicles from first registration 01.01.2006, that is, from exhaust emission stage EURO 4, the two-stage procedure is retained for the time being:

Stage 1: Reading and evaluation of OBD data;

Stage 2: If not **all** readiness codes are set to positive, then in addition an exhaust tailpipe measurement has to be carried out, in this case opacity measurement, under free acceleration and evaluation of the "Official sticker value" using certified exhaust emission devices. This applies until further notice even for EURO 6 vehicles until renewed findings equivalent to "OBD vs.. exhaust gas measurement" are available.

Vehicles concerned: BMW, BMW i, BMW M, MINI and Rolls Royce petrol engine vehicles with exhaust emission stage "EURO 6" and from EU-exhaust gas-code "W", or German emission key number "36W0". Depending on the model introduced from production 07/2014.

Procedure: Official test scopes

1. EU wide test scopes (without Germany):

- Vehicle and vehicle documents match;
- Recording vehicle data for verification certificate;

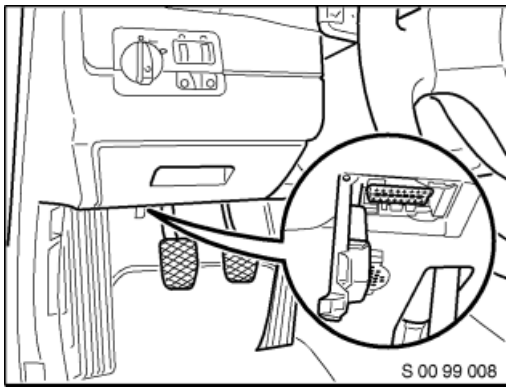
1.2 Exhaust gas classification test:

Check whether the vehicle corresponds to the exhaust emission stage/code "EURO 6 W" or "36W0". To do this, read out corresponding data from the certificate of acceptance part 1 (vehicle registration papers) in line 14 or in field 14.1.

1.3 Check by reading and evaluating the OBD data:

Connect one of a Generic ScanTool corresponding to the current OBD standards on the vehicle diagnosis interface. (Use ScanTools with printer output only.)





1.3.1 Functional test of the interface connecting ScanTool to the EOBD of the drive-control units

Display: **Type of the OBD report and the number of emission-relevant control units**

- See Enclosure 1: Graphics of all ScanTool modes or services
- Please refer to Enclosure 2: ScanTool read out and results to diesel vehicle

1.3.2 Malfunction indicator lamp check (MIL = malfunction indicator lamp)

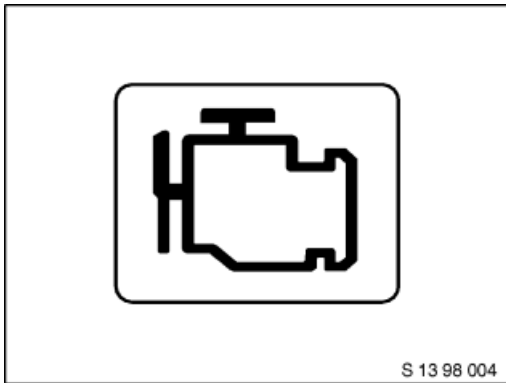


Figure of the malfunction indicator lamp (MIL)

- **Visual inspection of the function of malfunction indicator lamp (MIL)**
 - Ignition on – engine off - MIL lit = OK
 - Ignition on – engine off - MIL not lit = not OK
 - Ignition on – engine running - MIL off = OK
 - Ignition on – engine running - MIL lit = not OK
- **Reading the status of the MIL from the ScanTool in Mode 1-**
 - If the ScanTool output is "MIL Off": = OK
 - If the ScanTool output is "MIL On": = not OK

1.3.3 Status and evaluation of OBD readiness test (Readiness codes) in the ScanTool mode 1

Read out and evaluate individual readiness test codes in the two OBD categories:

- **Group B: Continuous monitoring**
- **Group C: Non-continuous monitoring**

Note: In the ScanTool, following selection is necessarily applicable:

"Delete readiness test for fault code"!

Here, the readiness tests from several driving cycles are displayed and the probability is highest that all supported RCs are set to positive. When selecting "Readiness test of this cycle", the supported RCs are usually not set to positive.



Generally, immediately before the exhaust-gas test without a wilful occasion, for example, if no drivability complaints have been made by the customers, **the fault memory should not be deleted**, because this will also delete all readiness test codes, in addition to the error codes.

Only within the scope of service review or for customer complaints, the fault memory should be viewed in mode 3 with regard to possible repeatedly confirmed errors shortly before the exhaust-gas test. If errors exist that would lead to a failure of the exhaust-gas test, carry out a repair and then delete the fault memory. Then 2-3 driving cycles* should be carried out in which the readiness of the individual systems can be reset.

* = Engine start, acceleration phases, constant-speed driving, overrun phase, idle operation and stopping the engine

Readiness tests(Readiness codes) Petrol engine:

<u>Continuous monitoring</u>	<u>Non-continuous monitoring</u>
- Byte B data -	- Byte C data -
0 misfire	0 Catalytic converter
1 Fuel system	1 Catalytic converter - heating
2 Components	2 Fuel tank ventilation system/EVAP
3 -Free- (if necessary O/D monitoring)	3 Secondary air system
	4 -Free- (if necessary air conditioning/refrigerant)
	5 Oxygen sensor
	6 Oxygen sensors heating
	7 EGR and/or Valvetronic system

Table: Designations of the Readiness Codes

Manufacturer's specifications for Readiness Code - Evaluation:

In the group B "continuous Überwachung_Data byte B", all parametrised and supported RCs must be set to positive. that is, the electrical check of the sensors/actuators has lapsed in all functions; to do this usually a 1-2 minute engine operation in idle position is sufficient. **If one of these RCs is not set to positive even when the engine is running** (also referred to as "test not carried out"), **then the exhaust-gas test shall be evaluated as failed.**

In the Group C, "non-continuous Überwachung_Data byte C" all, but at least 5, parametrised or supported RCs should be checked to be positive. Few "long-time needed" RCs cannot yet be set to **positive!** (also referred to as "test not carried out").

Reason: Their fault set conditions require a longer journey with different load conditions, speeds and specific atmospheric conditions after fault memory deletion.

For BMW and MINI diesel fuel engines from exhaust emission stage EURO 6, the following 2 RCs: Catalytic converter and secondary air may be exempted from RC evaluation, that is, not yet set to positive or Display bit 1.

Note:

The set result by a binary indication of the individual RCs is:

- 0 = checked at least once or diagnosis not supported
- 1 = Components displayed as not yet fully checked. The figure below shows the

Readiness Codes

Continuous testing_ Byte B data- Data: Petrol and diesel-engine vehicles



Bit		Supported/bit	Test carried out/ bit	Permissible bit values of the performed RCs for the exhaust-gas test evaluation at OK or passed
0	Misfire	Yes = 0 / No = 1	Yes = 0 / No = 1	0
1	Fuel system	Yes = 0 / No = 1	Yes = 0 / No = 1	0
2	General components	Yes = 0 / No = 1	Yes = 0 / No = 1	0
3	Free- (if necessary O-D monitoring)	Yes = 0 / No = 1	Yes = 0 / No = 1	0 if parametrised; Otherwise even 1

Non-continuous tests _ Data byte C/D data: Only diesel vehicles

Bit		Supported/bit	Test carried out/ bit	Permissible bit values of the performed RCs for the exhaust-gas test evaluation at OK or passed
0	Catalytic converter	Yes = 0 / No = 1	Yes = 0 / No = 1	0 or 1
1	Catalytic converter - heating	Yes = 0 / No = 1	Yes = 0 / No = 1	0
2	Fuel tank ventilation system/EVAP	Yes = 0 / No = 1	Yes = 0 / No = 1	0
3	Secondary air system	Yes = 0 / No = 1	Yes = 0 / No = 1	0 or 1
4	Free- (if necessary air conditioning)	Yes = 0 / No = 1	Yes = 0 / No = 1	0
5	Oxygen sensor	Yes = 0 / No = 1	Yes = 0 / No = 1	0
6	Oxygen sensor heating	Yes = 0 / No = 1	Yes = 0 / No = 1	0
7	EGR/Valvetronic	Yes = 0 / No = 1	Yes = 0 / No = 1	0

Graphic: Evaluation matrix of the readiness test bits

1.4 Record status of the fault memory in ScanTool mode 3*

(* = Mode 3 means storage of errors which have been confirmed over multiple driving cycles).

- If standardised **Powertrain codes**, for example, P0 123, P2 456 or manufacturer-specific Powertrain codes, e.g P1 789, P3 123, **are stored**: Test = not OK
- If no **Powertrain codes** are stored: Test = OK

1.5 Identity check of the chassis number (VIN) according to the comparison via ScanTool Mode 9:

Read out chassis number (VIN = Vehicle Identification Number) from ScanTool Mode 9 and compare it with the vehicle type plate:

If the VINs deviate from each other: Test = not OK

1.6 OBD final evaluation:

If the:

- MIL - function check and MIL - status are OK,



- the RC evaluation, taking into account "long-time RCs" not relevant to the set, is positive
- no errors are stored in mode 3,
- the VIN comparison: Vehicle to ScanTool -Mode 9- information is identical,

then the exhaust-gas test is to be concluded as "passed".

If one of the aforementioned points is not OK, the exhaust-gas test via OBD is considered failed.

The OBD data MIL and RC status from Mode 1; Error codes from Mode 3 and VIN from Mode 9 are to be printed on the verification certificate.

Note: If data communication is not possible in the event of several connection attempts between the ScanTool and the vehicle-side interface (OBD socket), the emissions test is classed as "not passed" and the vehicle is to be repaired.

2. Test scopes for exhaust-gas test on EURO 6 with petrol engine and closed-loop catalytic converter and OBD in Germany: :

In Germany, at present, the two-stage test procedure for all vehicles of categories M (passenger cars) and N (trucks) from the date of first registration 01.01.2006* is applicable even for EURO 6 vehicles with obligatory exhaust-gas test operator prompting. (* = from EURO 4 / IV) In addition, the exhaust-gas test may be performed on these vehicles from **01.06.2015** only with the operator prompting according to "Exhaust-gas test - devices user guide 5".

2.1. Level 1 = OBD - check:

Read out and evaluate the OBD data, as described in section 1.1 - 1.6, but with the following changes:

- **Section 1.2 Exhaust emission classification check on EURO 6 omitted** because all vehicles from first registration 01.01.2006 (from EURO 4) are primarily checked via the OBD.
- **In section 1.3.3, all continuous and all non-continuous supported readiness codes must be set to positive (bit = 0).**
- **If the readiness codes of the OBD system operated by the engine control unit are not or not completely set to positive**, that is, the OBD system itself is not yet ready for testing, for example, because the fault memory was deleted shortly before, **a exhaust gas tailpipe measurement must be carried out additionally according to Section 2.2.**

2.2. Level 2 = Exhaust gas opacity measurement as additional check under the following precondition:

Note: The following procedure generally also applies to all petrol vehicles with closed-loop catalytic converter before the first registration 01.01.2006. See also the BMW Service Information "Test instructions for the exhaust-gas test on BMW vehicles with petrol engines" from 04/2012.

2.2.1 Visual inspection of emission-relevant components:

Note: This test step will be deleted from the new version of §29_StVZO in accordance with 47th amendment regulation as from 01.07.2012, as the visual inspection is an integral part of the technical vehicle inspection and thus the same components are not inspected twice.

2.2.2 Effective check using emission measurement* at the exhaust tailpipe at operating temperature, that is, at minimum 60°C engine oil temperature.

Emissions threshold values at increased idle and idle position:

a. Increased speed in idle position°, that is, at least $n = 2500$ rpm and CO according to nominal data, otherwise CO to EURO 3: max. 0.3 vol %; CO from EURO 4: max. 0.2 vol % plus Lambda determination*: min. 0.97 – max. 1.03.

b. Idle position speed according to type-specific manufacturer's specifications: CO according to exhaust gas nominal data, otherwise CO to EURO 3: max. 0.5 vol %; CO from EURO 4: max. 0.3 vol %.

* = determined from CO, CO₂, O₂ and HC according to Brettschneider formula



* = engine speed range for all BMW vehicles: $n = 2300 - 2700$ rpm

Note: For catalytic converter conditioning reasons it is necessary both throughout the EU and in Germany to carry out the CO and lambda measurement first at increased engine speed and only then at idle.

Graphic: Opacity characteristic during engine start-up = free acceleration

2.2.3 Oxygen sensor control circuit check:

For BMW "closed-loop catalytic converter" vehicles from first registration in around 1996, the oxygen sensor control circuit check is carried out via the so-called "Replacement method". The oxygen sensor emissions control check is carried out by measuring the voltage excursion for oxygen-bistable sensors or the current for broadband oxygen sensors of control sensors installed at the catalytic converter inlet.

Measurements are made in idle position using usual diagnosis tools (for example, EOBD ScanTool integrated in the exhaust-gas test diagnosis tester) at an adequate lambda value from 0.97 to 1.03.

BMW examples:

Sensor type bistable sensor: voltage excursion delta min. 0/3 V

Sensor type broadband oxygen sensor: current from -0.115 to +0.077 mA

For BMW vehicles with the "Magermix" engines N43 and N53, due to large lambda range current values from: -1.60 to +1.82 mA apply

For detailed engine-specific information, see BMW emissions test nominal values.

Note: In Germany it is possible to select the mode for determining the opacity coefficient, i.e. its measuring circuit time constant, in the emission tester:

- Mode A: = "unfiltered", i.e. < 0.050 sec
- Mode B: = "filtered", i.e. $0.90 - 1.10$ sec

Generally mode B is to be used for BMW vehicles throughout the EU and in Germany in line with EU Directive 72/306/EEC.

General notes:

The procedure described in this service information also applies to the BMW vehicles with petrol engines from exhaust emission stage EURO 6 and plug-in hybrid technology, for example, BMW X5_F15-PHEV, BMW 225xe_F45-PHEV, BMW 330e_F30-PHEV and BMW i3_I01 with Range Extender or BMW i8_I12.

Note: In Germany, the operator authorised to conduct exhaust-gas test on high-voltage vehicles according to the specifications of the employers' liability insurance association/Statutory Accident Insurance "BGI/GUV-I 8686" must have successfully completed at least one approximately 1 hour-long "Briefing on working on intrinsically safe high voltage vehicles"

The manufacturing stage emissions test nominal values, for example, engine speed ranges; CO and oxygen sensor limit values including their current values are shown in the **BMW emissions test nominal data acquisition** related to the type.

These emissions test nominal values are called up, depending on the user, via the Intranet or Extranet of the BMW Aftersales Portal and for "third-party users", via the Internet from the BMW web portal Technical Parts information system: "ASAP", module - emissions test nominal values, at the web addresses:
<http://www.parts.bmwgroup.com> or

Moreover, these data can also be obtained from the data catalogues of the open-market repair data publishers (e.g. DAT, Eurotax, Autodata, etc.) once their publications have been updated.

Incidentally, in Germany, the new "Guidelines for conducting exhaust gas test on vehicles according to Section 6.8.2 of Enclosure VIIIa German road traffic licensing regulations (StVZO) from 30.09.2014" are applicable.



Country-specific specifications of other countries must be given priority in any case to this SI specifications.

Enclosure 1 "ScanTool services"

Reading and display functions of the OBD - Generic ScanTools

	Select scan tool connected to OBD functions interface	
	Detect the EOBD or US OBD-2 diagnosis report	Example: Society of Automotive Engineers J 1850, International Organization for Standardisation 9141-2, International Organization for Standardisation 14230-4 (= Key Word Protocol-2000 Fast), International Organization for Standardisation 15765-4 (= CAN);
<u>Service 01</u>	<u>Malfunction indicator lamp status; Readiness code; Number of stored errors; call-up of current engine data (e.g.: n-mot; temperatures; load conditions etc.)</u>	Listing of all supported systems/functions;
Service 02	Calling-up "Freeze Frame" data to stored error codes, for example, to P0100: for n = 1,200 revolutions per minute; Tw = 22°C; Partial load= 10%, v = 0 km/h, etc.	Marginal conditions in which error codes were set
<u>Service 03</u>	<u>Calling-up all set error codes. g. P0100 "Air flow circuit malfunction"</u>	<u>Listing of all error codes that make the malfunction indicator lamp light up ; Faults that are confirmed over multiple driving cycles</u>
Service 04	Deleting the OBD error codes, Freeze Frame and all other data	Only permissible for test purposes after repair or if renewed driving cycle occurs
Service 05	Monitoring of oxygen sensors, for example, sensor 1: 0.35 <--> 0.87 volts	Checking the current control voltage - <u>engine must be running</u>
Service 06	Call-up of the shadow fault memory, e. g. P0410 "Secondary air feed malfunction"	Not continuously monitored functions, for example, only 1 x after each engine start
Service 07	Call-up of the shadow fault memory, for example, P0133 oxygen sensor 1 = slow response	Continuous monitoring; fault codes stored here must not yet lead to the lighting up of malfunction indicator lamp
Service 08	System or components, for example, valve actuation for fuel tank ventilation system	Only required for in-depth diagnosis steps in Service
<u>Service 09</u>	<u>Vehicle identification (chassis number control units number; mileage with malfunction indicator lamp ON)</u>	for example, for documentation; as well as data for official field monitoring
Service \$0A	Display permanent error codes	for example, non-deletable NOx codes



Test instructions for the exhaust-gas (emissions) test on BMW vehicles with petrol engines

BMW vehicles as from model year 1968, MINI as from R50 and Rolls-Royce as from RR01

Situation: With reference to the presentation of the basics pertaining to the exhaust emissions test in accordance with Service Information bulletin 00 18 12 (864) of 01.04.2012 "General and legal information on performing the periodic exhaust-gas (emissions) test", the exact test scopes and technical details are described for the exhaust emissions test on vehicles with engines with externally supplied ignition.

Vehicles concerned: BMW vehicles as from model year 09/1968, MINI as from R59 and Rolls-Royce as from RR01

Procedure: A. Official test scopes:

1. Vehicles with petrol engine without or with open-loop-controlled exhaust gas aftertreatment system

BMW vehicles from 1968 to mid-1986

1.1. EU-wide test scopes:

- **Vehicle identification check:** Vehicle and vehicle documents match; recording of the vehicle data for the test certificate.
- **Visual inspection** of the exhaust system and if necessary of the emission reduction unit (e.g. BMW NOx Control) for completeness, correct condition and leak-tightness.
- **Effective check** by means of exhaust-side CO measurement at the exhaust tailpipe at operating temperature, i.e. at min. 60°C engine oil temperature.
- Emissions limit value in idle operation:

Vehicles from 1968 – 1986, i.e. without EU type approval as per 70/220/EEC:

- as per type-specific manufacturer specifications, see BMW emissions test nominal values;
- otherwise max. 4.5 % by vol. CO
- Vehicles with EU type approval as per 70/220/EEC, or with date of first registration no later than as from 1.10.1986:
 - as per type-specific manufacturer specifications, see BMW emissions test nominal values;
 - otherwise max. 3.5 % by vol. CO

1.2. Change in Germany:

1.2.1 Setting check:

- Idle speed *
- Ignition point *
- Dwell angle *

* = as per manufacturer's specifications; see emissions test nominal values

1.2.2 Note on Visual inspection test step:

This test step is dropped from the new version of §29 StVZO as per the 47th amendment regulation as from 01.07.2012, as the visual inspection is an integral part of the technical motor vehicle inspection and thus the same components are not inspected twice.

2. Vehicles with petrol engine and with closed-loop-controlled exhaust gas aftertreatment system, e.g. closed-loop-controlled catalytic converter, but without EOBD:



BMW vehicles as from 09/1986 , or with exhaust gas approval as from ECE R 15.04 or 70/220/EEC up to and including EURO 2 (mid-1999)

2.1 EU-wide test scopes:

- **Vehicle identification check:** Vehicle and vehicle documents match; recording of the vehicle data for the test certificate.
- **Visual inspection** of the exhaust system and all emission reduction units (e.g. tank ventilation, secondary air systems, etc.) incl. narrowed tank filler neck for unleaded fuel, for completeness, correct condition and leak-tightness.
- **Effective check** by means of 4-component emission measurement* at the exhaust tailpipe at operating temperature, i.e. at min. 60°C engine oil temperature.
- Exhaust gas limit values at increased idle and then at idle:
 - a. Increased idle speed*, i.e. at least $n = 2000$ rpm and
CO as per emissions test nominal values, otherwise CO max. 0.3 % by vol.
plus lambda determination[°]: min. 0.97 – max. 1.03
 - b. Idle speed as per type-specific manufacturer specification and:
CO as per emissions test nominal values, otherwise CO max. 0.5 % by vol.
* = engine speed range for all BMW vehicles: $n = 2300 - 2700$ rpm
° = determined from CO, CO₂, O₂ and HC acc. to Brettschneider formula

2.2. Change in Germany regarding EU scope as per Points 2 and 2.1:

2.2.1 Note on Visual inspection test step:

This test step is dropped from the new version of §29_StVZO as per the 47th amendment regulation as from 01.07.2012, as the visual inspection is an integral part of the technical motor vehicle inspection and thus the same components are not inspected twice.

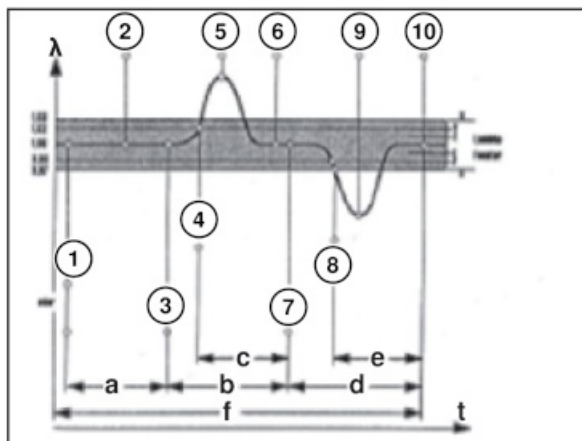
2.2.2 Additional control loop test acc. to a or b or c:

a. Basic procedure, i.e. by means of feedforward control:

Measurement of the lambda correction value; setpoint: 0.97 – 1.03 after feedforward and cancellation of a disturbance variable (usually excess air) and thus of a caused minimum lambda excursion of $\pm 0.02 - 0.03$.
Measurement speed at BMW: generally at idle.

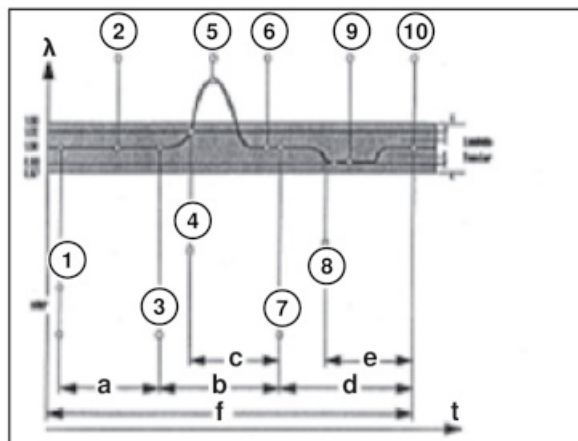


Mit 2 Lambda-Halbwellen



- 1 Anweisung Starttaste
- 2 Lambda-Anfangswert
- 3 Anweisung: Störgröße aufbringen
- 4 AU-Gerät erkennt Lambda-Änderung (mager)
- 5 Lambda-Maximalwert
- 6 Lambda-Ausregelwert
- 7 Anweisung: Störgröße zurücknehmen
- 8 AU-Gerät erkennt Lambda-Änderung (fett)
- 9 Lambda-Minimalwert
- 10 Lambda-Schlußwert erfassen

Mit 1 Lambda-Halbwelle



- a Maximal 60 s
- b Maximal 60 s (wird gelöscht wenn 4 erkannt)
- c Maximal 60 s
- d Maximal 60 s (wird gelöscht wenn 8 erkannt)
- e Maximal 60 s
- f Maximal 10 Minuten, gemessen seit Ende der Katalysator-Konditionierung
- x Gesetzliche Erkennungsschwelle für Lambda-Änderung (wenn keine Herstellerdaten vorhanden)
- y Vom Fahrzeughersteller angegebene Erkennungsschwelle für Lambda-Änderung

RB99 01343

Lambda step change characteristic after feedforward of a disturbance variable

German BMW models produced between 09/1993 and mid-1999 had as standard installed interference air valves for an air inlet to the intake manifold. Suitable retrofit kits were available from the Parts Service for vehicles prior to 09/1993.

>> For details, see also SI 11 09 93 (710) Issue 11/1993

and SI 00 18 94 (823) Issue 07/1994

and SI 00 17 94 (822) Issue 07/1994

and SI 00 29 94 (851) Issue 09/1994

and SI 00 06 95 (920) Issue 04/1995

Or:

b. Alternative procedure:

Readout and evaluation of all lambda-relevant fault codes from engine control units with diagnostic functions (BMW as from DME 1.1): Presence of such a fault as per manufacturer's specification = not OK

>> For details, see also SI 0019 93 (738) Issue 11/1993

and SI 00 23 94 (754) Issue 12/1993

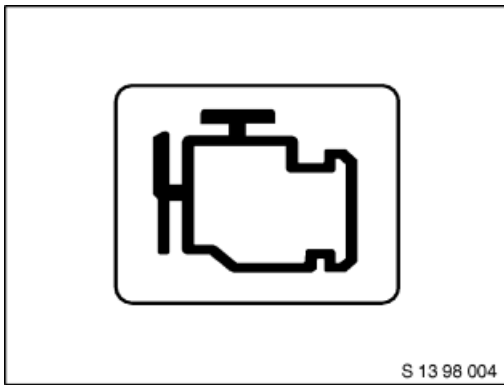
and SI 00 12 01 (696) Issue 05/2001

Or:

c. Substitute procedure: Only with assessment by officially appointed emissions test expert issued for BMW:

- by assessment of the malfunction indicator lamp (MIL):





Malfunction indicator lamp (MIL)

>> For details, see also SI 0019 93 (738) Issue 11/1993

and SI 00 15 00 (615) Issue 09/2000

or

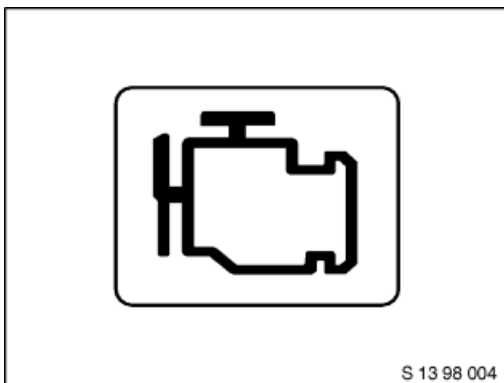
- by measurement of the voltage excursion or the current of the lambda control sensors at idle using generally customary diagnostic tools (e.g. EOBD scan tool integrated in the emission tester) with an adequate lambda value of 0.97 – 1.03:

BMW examples:

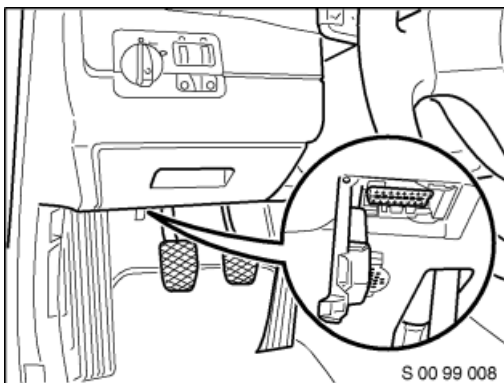
Sensor type - discrete-level sensor: voltage excursion delta min. 0/3 V

Sensor type - wide-band sensor: current from -0.115 to +0.077 mA

3. Vehicles with petrol engine and with closed-loop-controlled exhaust gas aftertreatment system and with EOBD (from EURO 3 and higher)



Malfunction indicator lamp (MIL)



OBD diagnosis connection

3.1 EU-wide test scopes:

Basically all scopes, as described in Point 2.1; but extended:

- For **visual inspection** to include OBD-side fitting specifications such as the captive lock on the fuel filler



cap (at BMW rubber band in fuel filler flap)

- b. **Additionally readout / evaluation of OBD-relevant data using a standardised scan tool:** -Display and operating fields, see Enclosure-

> Status of malfunction indicator lamp (MIL): Malfunction Indicator Lamp):

Ignition on:

- Engine off - MIL lit = OK
- Engine off - MIL not lit = not OK
- Engine running - MIL off = OK
- Engine running - MIL lit = not OK

> Status of fault memory in Mode 3 (= faults confirmed over several driving cycles):

- If standardised P codes (Powertrain codes), e.g. P0 100 or P2 230, are stored = not OK
- If no P codes are stored = OK

- c. **Intensified exhaust gas limit during the effective check:**

CO at increased idle max. 0.2 % by vol.

CO at idle max. 0.3 % by vol.

3.2 In Germany for vehicles first registered as from 01.01.2006:

Similar content as described in EU in 3.1, but with modified test steps, as a **2-stage test procedure**:

- **Vehicle identification check:** Vehicle and vehicle documents match; recording of the vehicle data for the test certificate.
- **Visual inspection** of the exhaust system and if necessary of the emission reduction unit (e.g. BMW NOx Control) for completeness, correct condition and leak-tightness.

Note: This test step is dropped from the new version of §29_StVZO as per the 47th amendment regulation as from 01.07.2012, as the visual inspection is an integral part of the technical motor vehicle inspection and thus the same components are not inspected twice.

> **Status of malfunction indicator lamp (MIL)**

Stage 1 of test: OBD function check:

Ignition on:

- Engine off - MIL lit = OK
- Engine off - MIL not lit = not OK
- Engine running - MIL off = OK
- Engine running - MIL lit = not OK

> **Status of OBD test readiness:**

I.e. readout and evaluation of the individual test readiness codes (RC) in the two OBD categories: continuous monitoring (Group A) and non-continuous monitoring (Group B) in Mode 1.

If all the RCs operated by the engine control unit are positively set, i.e. the OBD self-test has run through all the functions, then:

> Record **status of fault memory in Mode 3** (= faults confirmed over several driving cycles):

- If standardised P codes (Powertrain codes), e.g. P0 100 or P2 230, are stored = not OK
- If no P codes are stored = OK

> OBD final evaluation: If the MIL status is OK and the RCs have run positively and no faults are stored in Mode 3, then the emissions test can be concluded as OK.

Note: If data communication is not possible in the event of several connection attempts between the scan tool and the vehicle-side interface (OBD socket), the emissions test is classed as "not passed"!!



Exception: The vehicle manufacturer has applied for a substitute procedure for vehicles which have complied in advance with the EURO-3/OBD standard. The applicable test procedure is then the procedure as set out in Points 2.1 and 2.2 !!

Stage 2 Effective check by means of exhaust tailpipe measurement:

If the readiness codes are not or not completely positively set, i.e. the OBD system itself is not yet ready for testing; e.g. because the fault memory was deleted before, an emission measurement must additionally be carried, with the intensified limits as from EURO 3:

- **Effective check** at the exhaust tailpipe at operating temperature, i.e. min. 60°C “engine temperature”:

This engine temperature can - like the engine speed - be read out by the scan tool from the OBD system.

- Emissions limit value at idle and increased idle:
 - a. Increased idle speed, i.e. min. $n = 2000$ rpm and CO as per emissions test nominal values, but CO max. 0.2 % by vol. plus lambda measurement*: min. 0.97 – max. 1.03
 - b. Idle speed as per type-specific manufacturer specification and: carbon monoxide as per emissions test nominal values, but **CO max. 0.3 % by vol.**

Note: For catalytic converter conditioning reasons it is necessary both throughout the EU and in Germany to carry out the CO and lambda measurement first at increased engine speed and only then at idle.

B: BMW engine specifics:

1. Emissions test procedure for vehicles with separate exhaust emission systems

>> See also SI 00 24 94 (755) 01/1994

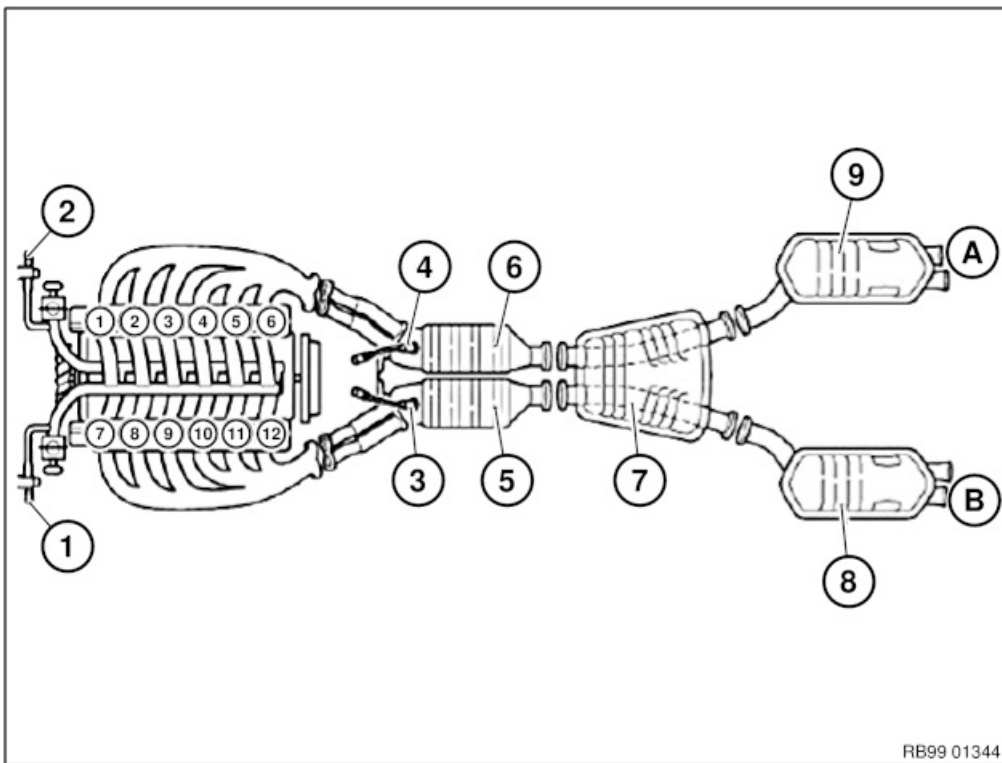
Vehicles concerned:

- E31 with M60 and M70/S70
- E32 with M60 and M70
- E34 with M60

Situation:

In the case of vehicles with separate exhaust branches or with several separate engine/lambda control systems, the emission measurement (CO and lambda) and the lambda control loop test must be carried out separately for each control unit or each exhaust branch.





- 1 Interference air valve, cylinder bank (CB) 1 to 6
- 2 Interference air valve, cylinder bank (CB) 7 to 12
- 3 Lambda oxygen sensor, cylinder bank (CB) 7 to 12
- 4 Lambda oxygen sensor, cylinder bank (CB) 1 to 6
- 5 Catalytic converter, cylinder bank (CB) 7 to 12
- 6 Catalytic converter, cylinder bank (CB) 1 to 6
- 7 Centre silencer
- 8 Rear silencer, cylinder bank 7-12
- 9 Rear silencer, cylinder bank (CB) 1 to 6
- A Tailpipes for cylinder bank (CB) 1 to 6
- B Tailpipes for cylinder bank (CB) 7 to 12

Procedure: For example emissions test procedure E31 with M70 and S70

A) Basic procedure

1. Vehicle identification
2. Setpoint value input or setpoint value call-up
3. Visual inspection
4. Setting check
5. Insert exhaust gas analyser probe in one of the right rear silencer tailpipes (A) of CB 1 - 6
6. Catalytic converter conditioning 3 mins./3000 rpm for catalytic converter (no. 6) of CB 1 - 6
7. CO partial load; lambda partial load $n \geq 2500$ rpm, CB 1 - 6
8. CO idle CB 1 - 6
9. Lambda control loop test: actuate interference air valve (1) CB 1 - 6
10. Insert exhaust gas analyser probe in one of the left rear silencer tailpipes (B) of CB 7 - 12
11. Catalytic converter conditioning * for catalytic converter (no. 5) of CB 7 - 12
12. CO partial load; lambda partial load $n \geq 2500$ rpm, CB 7 - 12
13. CO idle CB 7 - 12
14. Lambda control loop test: actuate interference air valve (2) CB 7 - 12
15. Print out emissions test assessment and test certificate



B) Alternative procedure

1. Read out DME fault memory, delete if necessary
2. Vehicle identification
3. Setpoint value input or setpoint value call-up
4. Visual inspection
5. Setting check
6. Insert exhaust gas analyser probe in one of the right rear silencer tailpipes (A) of CB 1 -6
7. Catalytic converter conditioning 3 mins./3000 rpm for catalytic converter (no. 6) of CB 1 - 6
8. CO partial load; lambda partial load $n \geq 2500$ rpm for CB 1 - 6
9. CO idle CB 1 - 6
10. Insert exhaust gas analyser probe in one of the left rear silencer tailpipes (B) of CB 7 - 12
11. Catalytic converter conditioning * for catalytic converter (no. 5) of CB 7 - 12
12. CO partial load; lambda partial load $n \geq 2500$ rpm, CB 7 - 12
13. CO idle CB 7 - 12
14. Lambda control loop test: Enter MoDiC result
15. Print out emissions test assessment and test certificate

2. Surging idle in BMW 3 Series / E30 with M40 engines

Complaint:

On E30 vehicles with M40 the CO and the lambda value cannot be properly determined during the emission measurement in the course of the emissions test at increased idle speed (2500 - 3000 rpm) due to high speed fluctuations ("surging").

An emissions test therefore not possible. The emissions test confirms this with: Engine speed outside the tolerance band.

Cause:

The engine fluctuates between partial load and overrun fuel cutoff.

Procedure:

To achieve a stable engine speed, the following consumer must be switched on as additional loads:

- a. Heated rear window
- b. Low-beam headlights
- c. Blower (stage 3-4)

Under these conditions the speed constancy required for this test step is assured at increased idle (2500 – 3000 rpm).

3. OBD data communication problems during the exhaust emissions test on vehicles with closed-loop-controlled catalytic converters

Affected vehicles: E36, E53 after 01.01.1998

Complaint:

During an exhaust emissions test on BMW vehicles with petrol engines and closed-loop-controlled catalytic converters plus EOBD the OBD emissions test procedure prescribed by different national authorities cannot or cannot be correctly carried out because there is no data communication from the vehicle via the scan tool to the emission tester

Cause:

1. **Vehicles with 2 diagnosis connections (up to 31.08.2000):**

On vehicles with 2 diagnosis connections, the 20-pin BMW diagnosis socket in the engine compartment and the 16-pin OBD standard diagnosis socket in the passenger compartment the data line is interrupted



due to cover being opened on the 20-pin diagnosis socket in the engine compartment.

2. Vehicles only with 16-pin OBD standard connection:

Contact problems due to pushed-back jacks in the vehicle-side OBD socket. Contact problems due to unfavourable shape of OBD connector at scan tool end.

3. Scan tool of BMW/AVL emission tester:

Software error in the scan tool of the AVL emission tester if software version is lower than 2.08.

4. Incorrect selection of emission test mode on the emission tester:

On vehicles with closed-loop-controlled catalytic converters without full OBD functions (technically possible up to 31.05.1999) the OBD closed-loop-controlled emissions test procedure prescribed for EURO 3 is selected although these vehicles in accordance with the statutory emissions classification are only certified to EU-2, or EU-2/D3 or D4.

5. Incorrect selection of the lambda control sensor type in the operator prompting of the emissions test procedure:

For example for vehicles with lambda oxygen sensors fitted as standard the wide-band sensor type is selected.

The upshot of this is that the emission tester expects and current value output although only voltage values are output by discrete-level sensors. The scan tool or the emissions test operator prompting interprets the non-display of a current value as a communication problem and evaluates the OBD emissions test as not passed.

Remedy for:

1. Vehicles with 2 diagnosis connections:

The cover of the 20-pin diagnosis connection in the engine compartment must always be closed when a diagnosis pick-off is being performed at the 16-pin diagnosis socket because the wire links to the 16-pin diagnosis connection are integrated in the cover.

2. Vehicles only with 16-pin OBD standard connection:

Visual inspection as to whether the jacks are correctly positioned and properly engaged in compartments 4, 5, 7, 15, 16. Establish the desired state if necessary.

Visual inspection as to whether the housing of the scan tool connector is inserted up to the stop in the diagnostic socket and is not prematurely resting on account of a collar on the pin trapezoid etc. on the socket surround without safely touching the contact blades.

3. Scan tool of BMW/AVL emission tester:

Contact the responsible AVL-Ditest Service representative for an update of the scan tool software to version 2.08 or higher.

4. Incorrect selection of emission test mode on the emission tester:

Check by referring to the official vehicle documents whether the vehicle emissions classification matches the selected test mode in the emission tester.

For example whether EURO 2 only emission measurement or EURO 3 = with OBD data acquisition.

5. Incorrect selection of the lambda control sensor type in the operator prompting of the emissions test procedure:

The correct choice of lambda oxygen sensor type (i.e. discrete-level sensor with voltage value or wide-



band sensor with current value) must be obtained on a model-specific basis from the BMW emissions test nominal values.

4. Changed test specifications (emissions test nominal values) for BMW lean-mix engines N43 and N53.

Due to the special design of these progressive engines, the engine speed and lambda specifications have had to be adapted in line with relevant field findings:

4.1. Lambda change for N43 and N53:

For the emission measurement at the tailpipe that may be required the following new **lambda values** apply to petrol lean-mix engines at idle and increased idle speed: **0,7 – 4,0**

The associated **current value range of the lambda control sensors is: - 1.60 to + 1.82 mA.**

The exhaust emission measurement must be repeated if regeneration of the NOx catalyst storage converter, which takes max. 10 secs. and leads to lambda values substantially lower than 0.97 or CO values higher than 3 % by vol., is initiated by the DME control unit during the exhaust emission measurement.

4.2. Behaviour of the "increased" idle speed only for N43:

The engine control system MSD80 and MSD81 contains a time- and speed-dependent component protection function to avoid thermal damage to N43 engines.

This means that for a stationary vehicle ($v = 0$ km/h) and acceleration, e.g. to bring the engine to the operating temperature quicker, after 150 seconds the increased idle speed is limited to max. 2000 rpm. At the same time the engine warning lamp (EML) is activated and a fault code (0x2F91) entered in the shadow memory (scan tool Mode 7).

For the performance of the emissions measurement in the legally required test step CO and lambda sensor measurement at increased idle speed, this means:

- To achieve the operating temperature the engine cannot be operated in a stationary position at an engine speed greater than 1900 rpm
- Then the test step "CO and lambda sensor measurement at increased idle speed", according to BMW specification 2300 – 2700 rpm, can be performed **within max. 150 seconds.**

Enclosure: Emissions test report on vehicles with on-board diagnosis



00 38 11 (768)

Engine oil level check - customer recommendation

Situation: A correct engine oil level and the right engine oil quality are a precondition for avoiding engine damage.

Note:

Engine oil consumption depends on the driving style and the conditions of use.

Vehicles concerned: MINI R55, R56, R57, R58, R59, R60

All BMW vehicles with engine N13

Procedure: Make customers aware during every service appointment of the importance of checking the engine oil level regularly. The check is performed using the oil dipstick for engine oil in the engine compartment.

Important!

On the engine oil qualities that have been approved by BMW should be used.

The vehicle-specific Owner's Handbook contains the right procedure for checking the engine oil and the approved oil types.



00 30 11 (735)

Final drive oil - new oil quality from 07/2011

Situation: In motor vehicles from production date 07/2011, the final drive oil SAF-XO is being replaced by the final drive oil Hypoid Axle Oil G1 (BOT448).

Vehicles concerned: All BMW without M models

All MINI

All Rolls-Royce

Procedure: In vehicles from production date 07/2011, use oil specification Hypoid Axle Oil G1 (BOT448) for oil filling/additions to the rear axle differential.

The final drive oils currently approved by BMW can be viewed in the current ISTA version (operating materials - main group 33).



11 03 04 (156)

BMW Quality Longlife-04

All

Situation: The launch of the E90 and E87 with diesel particulate filter, makes a new engine oil BMW Longlife-04 absolutely essential. The function of the diesel particulate filter and low fuel consumption can only be guaranteed for the vehicle's entire service life if BMW Longlife-04 engine oil is used.

Effect: A new type of additive in the engine oil means that less ash is formed during combustion and thus prevents the diesel particulate filter from becoming blocked with ash deposits.

Affected vehicles: This engine oil is unambiguously specified for diesel engines with diesel particulate filter. However, it also satisfies the requirements of spark-ignition engines. Longlife-04 engine oil specifications include the requirements of Longlife-01 and Longlife-98.

Longlife-04 oils are only approved for spark-ignition engines in Europe (EU plus Switzerland, Norway and Liechtenstein). They must not be used outside this area.

Procedure: For further information, please refer to BMW Operating Fluids Service Information bulletin "Specified engine oils for BMW Group engines" (Enclosure 3) .



Diagnosis of fuel tank systems with fuel tank leak diagnosis module (DMTL)

All US models

Situation: Since model year 1994, all US models have been equipped with a diagnosis-compatible system that checks the fuel supply system for leaks.

A leaking fuel supply system causes increased pollutant emissions and, according to American legislation, must be repaired immediately. The "Service Engine Soon" indicator lamp lights up to alert the driver.

Systems for leak detection are tank systems with leak diagnosis pump (LDP) and fuel tank leak diagnosis module (DMTL). These differ principally in the details listed in Table 1.

<u>LDP</u>	<u>DMTL</u>
Diaphragm pump	Vane pump
Vacuum line necessary for operation of the diaphragm	Compression system
Leak detection from \varnothing 1 mm	Leak detection from \varnothing 0,5 mm
Leak detection at fuel tank by means of external pressure application	Leak detection at fuel tank via test module and/or service function

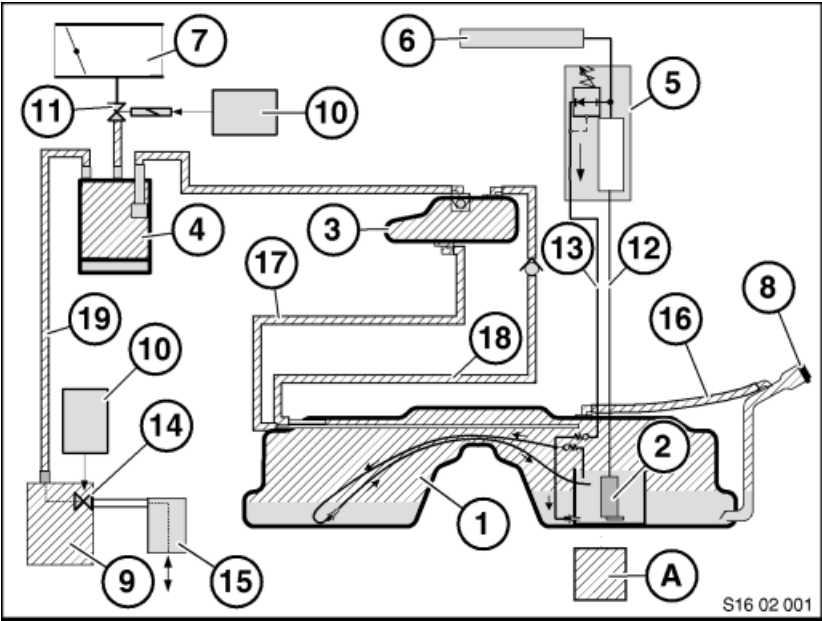


Figure 1: Block diagram of leak check

A	Pressurised components	10	DME control module
1	Tank	11	Fuel evaporation control valve
2	Fuel pump	12	Feed line
3	Expansion tank	13	Return line
4	Activated carbon filter	14	Solenoid valve in DMTL
5	Fuel filter with pressure regulator	15	Dust filter
6	Injection rail	16	Charge/vent line
7	Intake manifold	17	Fuel tank vent line I
8	Fuel filler cap	18	Fuel tank vent line II
9	LDP / DMTL	19	Fuel tank vent line III

1. Leakage test with leak-diagnosis pump (LDP)



US vehicles have an AKF cutoff valve and a tank pressure sensor that are used by the tank vent system diagnosis to enable the DME control unit to detect leaks > 1 mm in the tank and tank vent system.

With this system, a vacuum is formed and used to detect a leak. From Model Year 1998 (US 05.97), the vacuum system was replaced by a compression system.

The depression or compression is generated by a leak diagnosis pump bolted to the activated charcoal filter and is approx. 25 hPa. Leak diagnosis takes approx. 100 seconds, depending on the individual vehicle and is performed after nearly every cold start. The air filter at the LDP inlet is also new.

Note:

If this filter becomes extremely soiled, you may encounter problems when refuelling the vehicle. Diagnosis is guaranteed on the complete system (fuel circuit, leak diagnosis pump and reed contact).

1.1 Function description of pressure-leak diagnosis

When the DME control unit performs leak diagnosis, the DME control unit actuates the solenoid valve in the LDP unit. The intake manifold vacuum not reaches the level of the upper pump chamber (6, Fig. 2) and pulls the diaphragm (7, Fig. 2) up against the springs (3, Fig. 2).

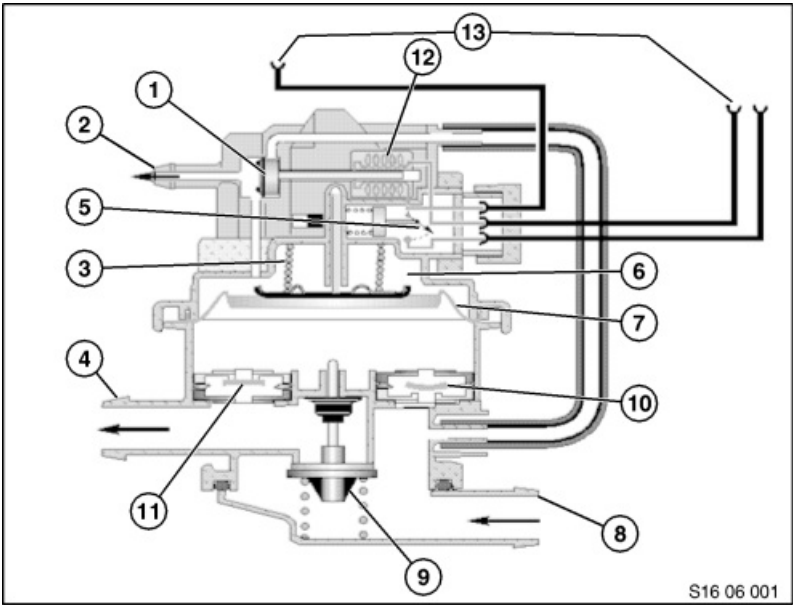


Figure 2: Leak-diagnosis pump (LDP)

1	Vacuum valve	8	Connection to atmosphere via filter
2	Connection to intake manifold vacuum	9	Open/closed valve (mechanical)
3	Spring	10	Intake valve
4	Connection to activated charcoal filter	11	Pressure valve
5	Reed contact	12	Solenoid valve coil
6	Upper pump chamber	13	Electrical connections
7	Diaphragm		

When the diaphragm (7, Fig. 2) is pulled up, a suction or pump effect is created under the diaphragm. Suction/pressure valves allow the oscillations of the diaphragm to create a pressure of approx. 25 hPa in the tank vent system, through the activated charcoal filter to the fuel filler cap. The oscillations of the diaphragm, i.e. the frequency, is measured by the reed contact (5, Fig. 2). The principle of pressure leakage diagnosis is based on a measurement of the repumping frequency needed by the leak diagnosis pump:

- Repumping frequency greater than nominal value: System **leaking**
- Repumping frequency less than nominal value: System **not leaking**

2nd leakage check in OBD II (on-board diagnosis) with fuel tank leak diagnosis module (DMTL)

This test procedure is able to detect leaks as small as > 0.5 mm in the fuel supply system. It thus constitutes a significant improvement in terms of protecting the environment.



<u>Start criterion</u>	<u>Start condition</u>
Engine	OFF
Last engine standstill	> 5 h
Duration of current journey	> 10 min
Fuel level	> 15 % and < 85 %
Ambient temperature	> 4 °C and < 35 °C
Altitude above mean sea level	< 2500 m
Battery voltage	> 11.0 V and < 14.5 V

Table 2: Start conditions for diagnosis

2.1 Function description of fuel tank leak diagnosis module check

Once all start conditions listed in Table 2 are satisfied, the DMTL will automatically start a tank leak measurement (OBD diagnosis).

The actual tank leak measurement comprises two phases: **reference leak measurement** and **tank leak measurement**.

2.1.1 Reference leak measurement

During the reference leak measurement, the vane pump blows air through the so-called reference leak (\varnothing 0.5 mm).

The power intake of the pump is measured and serves as the reference current during subsequent leak diagnosis. The strength of this pump current is approx. 20 mA to 30 mA.

This initial procedure takes place within the DMTL only and no other parts are affected. This phase serves as a self-test for the DMTL.

If the current for the reference leak measurement is outside a certain tolerance, the DMTL will be detected as faulty and the fault memory entry shown in Table 3 will be stored in the DME as an **internal DMTL fault**.

<u>DME variant</u>	<u>Manufacturer</u>	<u>Fault in plain text</u>
MS43	Siemens	142 "Module fault DMTL"
MS45	Siemens	27CD "Module fault DMTL"
MSV70	Siemens	2A17 "DMTL system fault"
MSV80	Siemens	2A17 "DMTL system fault"
MSD80	Siemens	2A17 "DMTL system fault"
ME9.2.2	Bosch	2A17 "DMTL system fault"
MED9.2.2	Bosch	2A17 "DMTL system fault"
ME9.2.3	Bosch	2A17 "DMTL system fault"
MSS65	Siemens / BMW	2776 "DMTL pump"

Table 3: Internal DMTL fault during reference leak measurement

2.1.2 Tank leak measurement

Fig. 1 shows the components of the fuel supply system, to which pressure is applied.

Pressure is applied to the components of the fuel supply system during the tank leak measurement procedure.

- The internal solenoid valve in the DMTL (14, Fig. 1) closes the line to the atmosphere
- The DMTL pump is activated

As a result, the fuel supply system is now a closed system (from the DMTL valve up to the fuel evaporation control valve) and the pressure is increased in the entire fuel system.

During the tank leak measurement, the pump's current draw is measured. An algorithm in the DME control unit compares the power intake of the reference leak measurement and of the tank leak measurement.



If the current draw during the tank leak measurement is lower than that recorded during the reference leak measurement, the fuel supply system is detected as free of leaks. A leak of > 0.5 mm must be present for the DME to store a fault.

<u>DME variant</u> <u>(engine)</u>	<u>Minor leak error</u> <u>> 0.5 mm</u> (fault in plain text)	<u>Major leak error</u> <u>> 1,0 mm</u> (fault in plain text)
MS43	8F "Fuel tank leak diagnosis with DMTL"	
MS45	27CC "DMTL: leak"	
MSV70	2A16 "Extremely minor leak"	2A15 "Minor leak"
MSV80	2A16 "Extremely minor leak"	2A15 "Minor leak"
MSD80	2A16 "Extremely minor leak"	2A15 "Minor leak"
ME9.2.2	2A16 "Extremely minor leak"	2A15 "Minor leak"
MED9.2.2	2A16 "Extremely minor leak"	2A15 "Minor leak"
ME9.2.3	2A16 "Extremely minor leak"	2A15 "Minor leak"
MSS65	27C3 "DMTL leak detection"	2779 "DMTL leak detection"

Table 4: Fault in tank leak measurement

Note:

Diagnosis will be interrupted if you start refuelling while diagnosis is in progress.

If the faults listed in Tables 2 and 3 are diagnosed twice in succession, an entry will be stored in the DME. The "Service Engine Soon" indicator light comes on, prompting the customer to drive to a workshop for diagnosis and leak detection.

A fault relating to fuel tank leak detection very often occurs in connection with the fuel filler cap not fitted or closed correctly.

The so-called **"Check Filler Cap" or "Check Gas Cap"** function has been introduced to prompt the customer to check the fuel filler cap.

3. Check Filler Cap / Check Gas Cap function

The Check Filler Cap / Check Gas Cap function is a prompt to the driver in the event that the fuel filler cap was not replaced or closed properly after refuelling.

This function usually runs after every refuelling and gives a warning message in the instrument cluster. This gives the driver the opportunity to close the fuel filler cap correctly before the system starts a leak check.

The key difference between this function and the OBD II leak check is that with the CFC / CGC, the MIL indicator light (or "Service Engine Soon" indicator light) is not actuated.

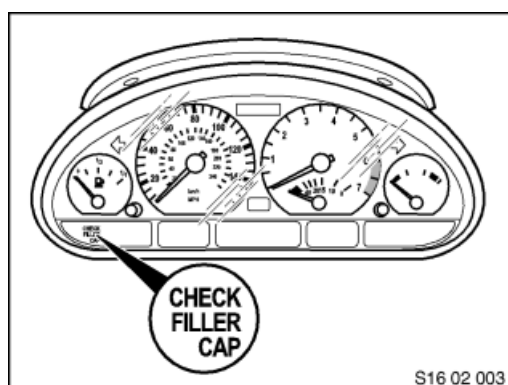


Figure 3:

"Check Filler Cap" indicator lamp.

Phase-in September 2001



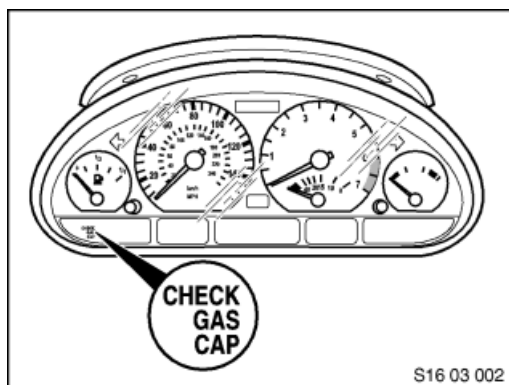


Figure 4:

"Check Filler Cap I" indicator lamp.

Phase-in September 2003

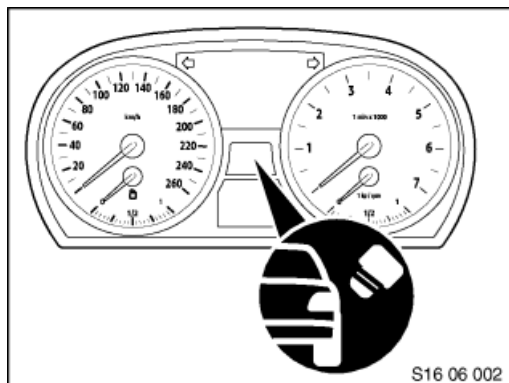


Figure 5:

"Check filler cap II" indicator lamp.

Phase-in September 2004

Procedure: Case 1. Internal DMTL fault (see Table 3)

Proceed as follows if such an internal DMTL fault is stored in the fault memory:

1. Clear the fault memory
2. Check whether the fuel filler cap is fitted correctly
3. Work through test module:
 - Complete vehicle
 - Drive
 - Engine control
 - Fuel tank system test
 - Fuel tank leak diagnosis module (DMTL)

This test module carries out a reference measurement and a fuel tank measurement and simultaneously checks the function of the DMTL pump.

If the fault is stored again in the fault memory after this test module, the DMTL must be replaced, please refer to Repair Instructions RA 16 13 015.

Important:

On no account open the DMTL!

Note:

Do not use lubricants during assembly.

After replacing the DMTL, clear the fault memory and once again work through the test module specified above.

If the repair has been carried out correctly, the test module will not store a fault entry.

If, after replacing the DMTL, a leak is detected in the system, it is highly likely that a leak was caused during the replacement procedure.

Note:

It is recommended to work through the above test module after **all** repairs to the fuel supply system.

Case 2. Fault during tank leak detection (see Table 4)

Fuel tank faults indicate a leak in the fuel supply system or incorrect operation of the fuel filler cap.

Important:



The most common causes of a fuel tank leak fault are:

- Fuel filler cap fitted crooked or not correctly
- Fuel filler cap not turned as far as it will go to the end stop (the end stop is indicated by a clearly audible "click")
- Retaining strap for fuel filler cap trapped between the filler cap itself and the fuel filler neck

Note:

Also refer to Service Information SI 16 02 99 (501) with regard to the fault patterns listed above.

Proceed as follows if a tank leak fault is stored in the fault memory:

1. Clear the fault memory
2. Check whether the fuel filler cap is fitted correctly
3. Work through test module:
 - Complete vehicle
 - Drive
 - Engine control
 - System diagnosis
 - DMTL system test
 - For further details, please refer to Repair Instructions 16 00 102 (M54).

If a leak is detected in the fuel supply system on completion of the test module this leak will be caused by the fuel filler cap not being closed correctly.

Important:

The costs in connection with the above causes are not incurred by any technical defects in the system and no warranty claims for reimbursement will be accepted.

A **fuel tank leak test** must be carried out if the fuel supply system is found to be leaking.

Case 3. Tank leak search

The fuel tank leak test procedure is described in Repair Instructions 16 00 510.

With the "DMTL pump actuation" service function, the internal solenoid valve (14, Fig. 2) in the DMTL closes the line to atmosphere and the DMTL pump is subsequently activated.

As a result, the fuel supply system is a closed system and pressure is built up.

The leak can now be found with the aid of a leak detector.

Important:

1. **External pressure must not** be applied to systems with DMTL because, in this case, the DMTL valve is not closed and a leak will inevitably be detected.
2. During the above service function, the DMTL pump runs uninterrupted for **approx. 15 minutes**. After this, the DME switches the DMTL pump off. If necessary, the test module can be repeated after a short waiting period.

Probable leak points:

- Fuel filler cap screwed on crooked or not up to the stop (8, Fig. 2)
- Fuel level sensor left or right leaking (replace sealing ring)
- Connection between fuel filler pipe and fuel tank
- Connections of filler vent line or of fuel tank vent lines I and II (16, 17, 18, Fig. 2)

Unlikely but possible leak points:

- DMTL solenoid valve
- Fuel evaporation control valve
- Connection between DMTL and activated carbon filter (19, Fig. 2)
- Pressure relief valve in the fuel filler cap
- Mating between fuel cap and fuel filler neck

Note:



If a repair was previously carried out on the fuel supply system, the leak will probably be at the repair location.

Important:

1. The **pressure relief valve** in the fuel filler cap can only be checked as described in Repair Instructions RA 16 11 130.
2. If the **mating between the fuel cap and the fuel filler neck** is leaking, the fuel cap and the fuel filler pipe (both!) must be replaced.

Case 4. Leak detector

The following devices can be used for leak detection purposes:

- Devices that respond to ultrasound
- Devices that respond to hydrocarbon hydrates

Part number of the device recommended by BMW (responds to hydrocarbon hydrates): 81 34 0 144 422.

Important:

Since, during normal vehicle operation, the vent line and the fuel evaporation control valve are subjected to fuel vapours (fuel residue remains on the line and valve), **leaks at the fuel evaporation control valve** cannot be detected effectively with devices that react to hydrocarbon hydrates.



23 03 98 (347)

Transmission difficult to shift/diagnostic aid

all model series

Complaint:

- Gears difficult to engage, especially 1st gear
- Gearshift mechanism catches

Note:

Field observations have shown the cause of transmissions being difficult to shift, especially of 1st gear being difficult to engage, to be primarily the clutch and only in a few cases to be the transmission itself. In order to trace the cause in the event of a complaint, the diagnostic aid described below under the heading Procedure has been compiled.

Cause:

1. For possible causes if a clutch problem is diagnosed, please refer to procedure described below:

- Taper spline of transmission input shaft not greased or grease dried out

Note on greasing taper spline:

Analyses have shown that grease used until now for greasing the taper spline "Microlube GL261 BMW" is not suitable for prolonged exposure to high bell housing temperatures.

- Drive plate on transmission input shaft difficult to move
- Drive plate wobble
- Air in hydraulic system of clutch mechanism
- Release bearing defective or difficult to move in the guide sleeve
- Drive plate or clutch pressure plate broken

2. For possible causes if a transmission problem is diagnosed:

- External gearshifts difficult, e.g. shift rod joints stiff
- Gear lever rubber bellows incorrectly fitted, e.g. positioned too high or too low on the gear lever
- Soundproofing between the outer gear mechanism and the body incorrectly inserted, e.g. on the wrong side or crumpled

Cause in transmission

- Synchronization faulty
- Inner gearshift mechanism stiff
- Water in transmission fluid (rare)

Affected vehicles:

All Models

Remedy:

Actions to remedy difficult to move drive plate on transmission input shaft taper spline:

In 04/1998, the grease used to date to grease the taper spline "Microlube GL261 BMW" was superseded by the more temperature-resistant grease "Esso UNIREX S2".

In case of repair, the transmission input shaft taper spline is now only to be lubricated using the new "Esso UNIREX S2" grease.

The old grease "Microlube GL261 BMW" is no longer to be used.

Procedure:

In case of customer complaint, localize the cause by following the diagnostic aid described below:

- **The engine runs at idling speed**
- **Depress the clutch**
- **Try to engage 1st gear from neutral**



If 1st gear is difficult to engage, hold the gear lever at the resistance point (about half total travel) with constant force. Then switch the engine off with the other hand (ignition off).

Diagnosis 1:

If 1st gear is then engaged completely, i.e. the gear lever moves to the end position without any additional pressure, **there is a problem in the clutch.**

Explanation:

Because the clutch does not uncouple completely, the transmission drive shaft transmits a residual torque when the engine is running. This inhibits the release and meshing of the sliding sleeve at the end of the synchronization process. Switching the engine off relieves the drive shaft of this torque.

A completely uncoupled clutch is thus simulated.

Remedial action for diagnosis 1:

Carefully clean the transmission input shaft taper spline and guide spigot to ensure that they are free from any residue.

Then apply the taper spline grease "Esso UNIREX 2" evenly and thinly with a paintbrush in the entire area of the taper spline, including in the taper groove, and on the guide spigot.

Renew the drive plate.

For additional notes on troubleshooting and remedy:

Please refer to Service Information bulletin 21 01 97 (251).

Diagnosis 2:

If the gear lever remains at the resistance point, **there is a problem in the outer gearshift mechanism or in the transmission .**

Remedial action for diagnosis 2:

troubleshooting as per cause 2.

Note on transmission installation:

Apply the taper spline grease "Esso UNIREX 2" evenly and thinly with a paintbrush in the entire area of the taper spline, including in the taper groove, and on the guide spigot. If the transmission is to be used again, the taper spline must be thoroughly cleaned to ensure that it is free from any residue.

Parts: The new taper spline grease "Esso UNIREX S2" is available through the customary parts ordering channels.

<u>Description</u>	<u>Part number</u>
"Esso UNIREX S2" (40g tube)	83 23 9 416 138



31 01 12 (833)

Visible corrosion on vehicle add-on parts

Situation: Since the market introduction of the E65/66 the engine compartment and underbody preservation has successively been dropped from all series for environmental protection reasons. This may result in visible corrosion of machined surfaces such as, for example, on chassis/suspension components, machined screwing/bolting points, screw connections, or on surfaces such as, for example, the joints and drive shafts!

To prevent or re-treat this surface corrosion, the dealer organisation should use the corrosion protection with BMW part number 83 19 2 317 997.

Vehicles concerned: All BMW, MINI series

Procedure: Apply a thin coating of corrosion inhibitor (using only a brush) to the affected areas.

Warning!

Risk of fire!

Do not apply any corrosion inhibitor to the engine or the exhaust system!



Enclosure 1 to SI 32 01 88 (828)

Re. Steering box on:

Vehicle: _____ Vehicle Identification Number: _____
Accident repair of: _____ Customer: _____
Dealer: _____ Dealer number: _____

According to Directive 3200... "Information on Replacing Steering Box After Accident Damage" issued by the manufacturer, the steering box should be replaced after a vehicle has been involved in an accident, including experiencing driving conditions similar to an accident, if any of the following points are applicable.

Damage, permanent deformation or fractures to:

- ☐ wheel rims in the event of a negative result from the wheel/axle alignment check
- ☐ spring struts, steering stubs and/or wheel carriers
- ☐ wishbones
- ☐ leading or trailing links or anti-roll bars with this function
- ☐ body-side screwing/attachment point for wheel-guide control components
- ☐ front axle support
- ☐ pitman arms
- ☐ track rods
- ☐ steering box features
- ☐ steering column
- ☐ visible or otherwise noticeable damage to the steering box
- ☐ unacceptable torque increase and jamming when the steering box is turned from lock to lock (without hydraulic/electrical assistance)
- ☐ fire damage

The points marked have been deemed to be damaged as a result of the accident, or driving conditions similar to an accident, in which the above-referenced vehicle was involved.

Important!

The vehicle's operating license will be invalidated whenever the function of any of its safety components is compromised!

The customer/insurer acknowledges that the points marked above have been deemed to be damaged as a result of the accident, or driving conditions similar to an accident, in which the above-referenced vehicle was involved. The customer/insurer further acknowledges that in such instances, the directive issued by the manufacturer requires the steering box to be replaced. Notwithstanding the foregoing, the customer/insurer has chosen not to accept replacement of the steering box as directed by the manufacturer, and thereby assumes full and sole responsibility for the continued operation of the steering box in the above-referenced vehicle, including any technical, mechanical or legal consequences.

Stamp/Signature (customer and insurer)



Enclosure 1 to SI 32 01 88 (828)

Concerns steering gear, steering column and steering shaft of:

Vehicle: _____ Vehicle identification number: _____
Accident repair of: _____ Customer: _____
Dealer: _____ Dealer no.: _____

According to the manufacturer's instructions, the steering gear must be replaced after incurring accident damage if one or more of the following points apply.

Damage, permanent deformation or fractures to:

- ☐ Wheel rims in the event of a negative result from the wheel alignment check
- ☐ Spring struts, steering stubs and wheel carriers
- ☐ Wishbones
- ☐ Struts or trailing links or anti-roll bar with this function
- ☐ Body-side screwing/attachment points for wheel guide/control components
- ☐ Front axle support
- ☐ Pitman arms
- ☐ Track rods
- ☐ Steering box fixtures
- ☐ Steering Column
- ☐ Visible or noticeable damage to the steering box
- ☐ Unacceptable torque increase and jamming when the steering box is turned from limit position to limit position (without hydraulic assistance)
- ☐ Permissible tolerances exceeded during wheel alignment check

The points marked with a cross have been identified as subsequent damage from the accident specified above.

According to the manufacturer's instructions, the steering column/steering shaft must be replaced after incurring accident damage if one or more of the following points apply:

- ☐ Visible or noticeable damage, deformation or breakage of the steering column or steering shaft
- ☐ Damage, permanent deformation or breakage of the track rod
- ☐ Unacceptable torque increase and jamming when the steering column is cranked from limit position to limit position (without hydraulic/electrical assistance)
- ☐ Permissible tolerances exceeded after wheel adjustment and wheel alignment (include alignment record with invoice/report if necessary)
- ☐ Positive check for activated crash system of the steering column

The points marked with a cross have been identified as subsequent damage from the accident specified above.

Important!

The vehicle's operating licence will be invalidated whenever the function of any of its safety components is compromised!

The customer or the insurance company, contrary to the manufacturer's instructions, refuses to have the steering gear replaced and thereby assumes responsibility for subsequent use of the steering gear/steering shaft/steering column in the vehicle specified above and for the technical and legal consequences arising from



such use.

Stamp/ Signature (Customer or Insurance Company)



Enclosure 1 to SI 32 01 88 (828)

Re. Steering box on:

Vehicle: _____ Vehicle Identification Number: _____
Accident repair of: _____ Customer: _____
Dealer: _____ Dealer number: _____

According to Directive 3200... "Information on Replacing Steering Box After Accident Damage" issued by the manufacturer, the steering box should be replaced after a vehicle has been involved in an accident, including experiencing driving conditions similar to an accident, if any of the following points are applicable.

Damage, permanent deformation or fractures to:

- ☐ wheel rims in the event of a negative result from the wheel/axle alignment check
- ☐ spring struts, steering stubs and/or wheel carriers
- ☐ wishbones
- ☐ leading or trailing links or anti-roll bars with this function
- ☐ body-side screwing/attachment point for wheel-guide control components
- ☐ front axle support
- ☐ pitman arms
- ☐ track rods
- ☐ steering box features
- ☐ steering column
- ☐ visible or otherwise noticeable damage to the steering box
- ☐ unacceptable torque increase and jamming when the steering box is turned from lock to lock (without hydraulic/electrical assistance)
- ☐ fire damage

The points marked have been deemed to be damaged as a result of the accident, or driving conditions similar to an accident, in which the above-referenced vehicle was involved.

Important!

The vehicle's operating license will be invalidated whenever the function of any of its safety components is compromised!

The customer/insurer acknowledges that the points marked above have been deemed to be damaged as a result of the accident, or driving conditions similar to an accident, in which the above-referenced vehicle was involved. The customer/insurer further acknowledges that in such instances, the directive issued by the manufacturer requires the steering box to be replaced. Notwithstanding the foregoing, the customer/insurer has chosen not to accept replacement of the steering box as directed by the manufacturer, and thereby assumes full and sole responsibility for the continued operation of the steering box in the above-referenced vehicle, including any technical, mechanical or legal consequences.

Stamp/Signature (customer and insurer)



Enclosure 1 to SI 32 01 88 (828)

Concerns steering gear, steering column and steering shaft of:

Vehicle: _____ Vehicle identification number: _____
Accident repair of: _____ Customer: _____
Dealer: _____ Dealer no.: _____

According to the manufacturer's instructions, the steering gear must be replaced after incurring accident damage if one or more of the following points apply.

Damage, permanent deformation or fractures to:

- ☐ Wheel rims in the event of a negative result from the wheel alignment check
- ☐ Spring struts, steering stubs and wheel carriers
- ☐ Wishbones
- ☐ Struts or trailing links or anti-roll bar with this function
- ☐ Body-side screwing/attachment points for wheel guide/control components
- ☐ Front axle support
- ☐ Pitman arms
- ☐ Track rods
- ☐ Steering box fixtures
- ☐ Steering Column
- ☐ Visible or noticeable damage to the steering box
- ☐ Unacceptable torque increase and jamming when the steering box is turned from limit position to limit position (without hydraulic assistance)
- ☐ Permissible tolerances exceeded during wheel alignment check

The points marked with a cross have been identified as subsequent damage from the accident specified above.

According to the manufacturer's instructions, the steering column/steering shaft must be replaced after incurring accident damage if one or more of the following points apply:

- ☐ Visible or noticeable damage, deformation or breakage of the steering column or steering shaft
- ☐ Damage, permanent deformation or breakage of the track rod
- ☐ Unacceptable torque increase and jamming when the steering column is cranked from limit position to limit position (without hydraulic/electrical assistance)
- ☐ Permissible tolerances exceeded after wheel adjustment and wheel alignment (include alignment record with invoice/report if necessary)
- ☐ Positive check for activated crash system of the steering column

The points marked with a cross have been identified as subsequent damage from the accident specified above.

Important!

The vehicle's operating licence will be invalidated whenever the function of any of its safety components is compromised!

The customer or the insurance company, contrary to the manufacturer's instructions, refuses to have the steering gear replaced and thereby assumes responsibility for subsequent use of the steering gear/steering shaft/steering column in the vehicle specified above and for the technical and legal consequences arising from



such use.

Stamp/ Signature (Customer or Insurance Company)



Enclosure 1 to SI 32 01 88 (828)

Re. Steering box on:

Vehicle: _____ Vehicle Identification Number: _____
Accident repair of: _____ Customer: _____
Dealer: _____ Dealer number: _____

According to Directive 3200... "Information on Replacing Steering Box After Accident Damage" issued by the manufacturer, the steering box should be replaced after a vehicle has been involved in an accident, including experiencing driving conditions similar to an accident, if any of the following points are applicable.

Damage, permanent deformation or fractures to:

- ☐ wheel rims in the event of a negative result from the wheel/axle alignment check
- ☐ spring struts, steering stubs and/or wheel carriers
- ☐ wishbones
- ☐ leading or trailing links or anti-roll bars with this function
- ☐ body-side screwing/attachment point for wheel-guide control components
- ☐ front axle support
- ☐ pitman arms
- ☐ track rods
- ☐ steering box features
- ☐ steering column
- ☐ visible or otherwise noticeable damage to the steering box
- ☐ unacceptable torque increase and jamming when the steering box is turned from lock to lock (without hydraulic/electrical assistance)
- ☐ fire damage

The points marked have been deemed to be damaged as a result of the accident, or driving conditions similar to an accident, in which the above-referenced vehicle was involved.

Important!

The vehicle's operating license will be invalidated whenever the function of any of its safety components is compromised!

The customer/insurer acknowledges that the points marked above have been deemed to be damaged as a result of the accident, or driving conditions similar to an accident, in which the above-referenced vehicle was involved. The customer/insurer further acknowledges that in such instances, the directive issued by the manufacturer requires the steering box to be replaced. Notwithstanding the foregoing, the customer/insurer has chosen not to accept replacement of the steering box as directed by the manufacturer, and thereby assumes full and sole responsibility for the continued operation of the steering box in the above-referenced vehicle, including any technical, mechanical or legal consequences.

Stamp/Signature (customer and insurer)



Enclosure 1 to SI 32 01 88 (828)

Concerns steering gear, steering column and steering shaft of:

Vehicle: _____ Vehicle identification number: _____
Accident repair of: _____ Customer: _____
Dealer: _____ Dealer no.: _____

According to the manufacturer's instructions, the steering gear must be replaced after incurring accident damage if one or more of the following points apply.

Damage, permanent deformation or fractures to:

- ☐ Wheel rims in the event of a negative result from the wheel alignment check
- ☐ Spring struts, steering stubs and wheel carriers
- ☐ Wishbones
- ☐ Struts or trailing links or anti-roll bar with this function
- ☐ Body-side screwing/attachment points for wheel guide/control components
- ☐ Front axle support
- ☐ Pitman arms
- ☐ Track rods
- ☐ Steering box fixtures
- ☐ Steering Column
- ☐ Visible or noticeable damage to the steering box
- ☐ Unacceptable torque increase and jamming when the steering box is turned from limit position to limit position (without hydraulic assistance)
- ☐ Permissible tolerances exceeded during wheel alignment check

The points marked with a cross have been identified as subsequent damage from the accident specified above.

According to the manufacturer's instructions, the steering column/steering shaft must be replaced after incurring accident damage if one or more of the following points apply:

- ☐ Visible or noticeable damage, deformation or breakage of the steering column or steering shaft
- ☐ Damage, permanent deformation or breakage of the track rod
- ☐ Unacceptable torque increase and jamming when the steering column is cranked from limit position to limit position (without hydraulic/electrical assistance)
- ☐ Permissible tolerances exceeded after wheel adjustment and wheel alignment (include alignment record with invoice/report if necessary)
- ☐ Positive check for activated crash system of the steering column

The points marked with a cross have been identified as subsequent damage from the accident specified above.

Important!

The vehicle's operating licence will be invalidated whenever the function of any of its safety components is compromised!

The customer or the insurance company, contrary to the manufacturer's instructions, refuses to have the steering gear replaced and thereby assumes responsibility for subsequent use of the steering gear/steering shaft/steering column in the vehicle specified above and for the technical and legal consequences arising from



such use.

Stamp/ Signature (Customer or Insurance Company)



31 01 12 (833)

Visible corrosion on vehicle add-on parts

Situation: Since the market introduction of the E65/66 the engine compartment and underbody preservation has successively been dropped from all series for environmental protection reasons. This may result in visible corrosion of machined surfaces such as, for example, on chassis/suspension components, machined screwing/bolting points, screw connections, or on surfaces such as, for example, the joints and drive shafts!

To prevent or re-treat this surface corrosion, the dealer organisation should use the corrosion protection with BMW part number 83 19 2 317 997.

Vehicles concerned: All BMW, MINI series

Procedure: Apply a thin coating of corrosion inhibitor (using only a brush) to the affected areas.

Warning!

Risk of fire!

Do not apply any corrosion inhibitor to the engine or the exhaust system!



00 30 11 (735)

Final drive oil - new oil quality from 07/2011

Situation: In motor vehicles from production date 07/2011, the final drive oil SAF-XO is being replaced by the final drive oil Hypoid Axle Oil G1 (BOT448).

Vehicles concerned: All BMW without M models

All MINI

All Rolls-Royce

Procedure: In vehicles from production date 07/2011, use oil specification Hypoid Axle Oil G1 (BOT448) for oil filling/additions to the rear axle differential.

The final drive oils currently approved by BMW can be viewed in the current ISTA version (operating materials - main group 33).



31 01 12 (833)

Visible corrosion on vehicle add-on parts

Situation: Since the market introduction of the E65/66 the engine compartment and underbody preservation has successively been dropped from all series for environmental protection reasons. This may result in visible corrosion of machined surfaces such as, for example, on chassis/suspension components, machined screwing/bolting points, screw connections, or on surfaces such as, for example, the joints and drive shafts!

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Vehicles concerned: All BMW, MINI series

Procedure: Apply a thin coating of corrosion inhibitor (using only a brush) to the affected areas.

Warning!

Risk of fire!

Do not apply any corrosion inhibitor to the engine or the exhaust system!



34 03 09 (594)

Instruction for replacement brake pads/ brake discs

(BMW/MINI)

Situation: The following procedures must absolutely be followed for professional and proper repairs.

Affected vehicles: BMW and MINI

Procedure: The following components are additionally absolutely required for a replacement of the **brake pads**:

- Brake pad sensor
- Brake block paste

For vehicles older than 48 months the following additional replacement is recommended:

- Spring retainer

The following components are additionally absolutely required for a replacement of the **brake discs**:

- Brake pads
- Brake pad sensor
- Brake block paste

For vehicles older than 48 months the following additional replacement is recommended:

- Spring retainer

The exact procedure should be taken from the vehicle-specific repair instructions.

The Electronic Parts Catalogue is supplemented with the additional instructions.



34 02 09 (561)

Modified wear limit for brake disc / brake pad replacement

(BMW/MINI)

Situation: The wear limit of the minimum brake disc thickness (MIN TH) is modified analogue to the M-vehicles from 'greater than or equal to' (\geq) to 'greater than' ($>$).

Affected vehicles: all BMW and MINI starting model year 2009

Procedure: The exact procedure for brake pad replacement is to be taken from the revised repair instructions.



36 0106 (251)

Inflating tyres with nitrogen (N2)

All series

Situation: The question is regularly asked, whether inflating the tyres with nitrogen instead of air has any benefit with respect to a "gradual loss of tyre pressure". This process is also known as diffusion (diffusion is the movement of miniscule particles, especially atoms or molecules).

Statement

Some companies regard inflating the tyres with nitrogen as a way of selling the customer a feature that has no practical benefit whatsoever with respect to diffusion. As nitrogen has larger molecules, it would indeed be logical to argue in favour of inflating the tyres with nitrogen instead of with air. However, the improvement achieved is only marginal because air is anyway made up of about 78 % nitrogen.

Composition of air:

- 78 % nitrogen (N2)
- 21 % oxygen (O2)
- <1 % inert gases
- 0.03 % carbon dioxide (CO2)

The reduced rate in the drop in pressure inside the tyre is just a few hundredths of a bar over several months. Inflating the tyres with nitrogen does not relieve the driver from his duty (described in the Owner's Handbook) to check the tyre pressures regularly. Nitrogen is used in aviation and in motor racing because, in the event of an accident and the associated risk of fire, no additional oxygen should be fed from the tyres.

Affected vehicles: All series

Procedure: Recommendation

BMW does not recommend inflating tyres with nitrogen. Should individual customers wish to have their tyre inflated with nitrogen, their wishes may be accommodated.



Repairing runflat tyres

All models

Situation: The question is regularly asked whether a repair should be performed on runflat tyres after a loss of pressure.



Runflat tyres (also known as "tyres with emergency running characteristics") can be recognised by a circular symbol on the side wall bearing the letters RSC (Runflat System Component).

Note:

As a general rule, BMW has never recommended repairs on tyres. However, should individual customers wish to have their tyre repaired, their wishes may be accommodated.

A list of tyre manufacturers who approve or disapprove of repairs to runflat tyres can be found in the section headed "Procedure".

Procedure:

1. Contact the local representative of the tyre manufacturer concerned.
2. Please note the following when naming the nearest authorised tyre dealer for runflat tyres:

Tyre manufacturers who **approve** of repairs on runflat tyres (under certain conditions):

- Michelin
- Dunlop
- Goodyear
- Bridgestone

Tyre manufacturers who **disapprove** of repairs on runflat tyres:

- Pirelli
- Continental



Min/max tolerance sample catalogue for paintwork and corrosion damage

All

Situation: Min/max tolerance samples are available to enable improved pinpointing of paint and corrosion damage. They are a supplement to the BMW Paintwork publication announced in Service Information 41 01 08 (452) and published in October 2008.

Vehicles that are older than three years after the first registration date may only be repaired by replacing components if the damage exceeds a defined extent (see min/max tolerance samples). With immediate effect, certain paint damage patterns attributed to incipient corrosion may only be repaired by means of spot repairs as small as possible.

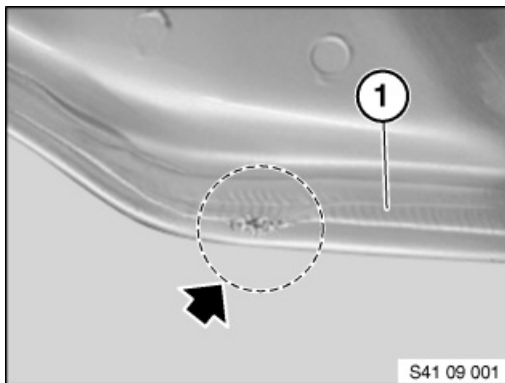
There are currently five max/min tolerance samples:

- **Paintwork damage with min/max tolerance sample A** (critical damage pattern)
- **Paintwork damage with min/max tolerance sample B** (minor damage pattern)
- **Paintwork damage with min/max tolerance sample C** (scrape marks)
- **Paint damage with tolerance sample D** (rubber grommets)
- **Paint damage with min/max tolerance sample E** (vehicle underbody)

All customer complaints are to be classified based on these additional min/max tolerance samples.

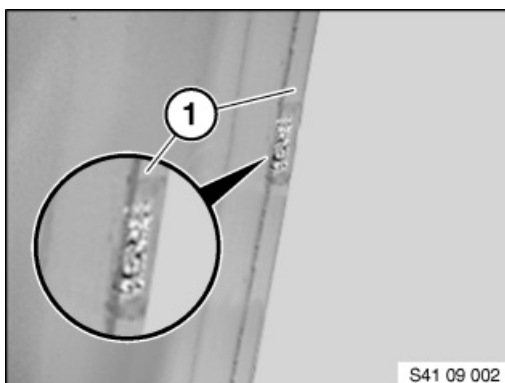
1. Min/max tolerance sample A (critical paintwork damage)

General appearance: Rust is visible without scratching the surface.



Sample A1:

Visible rusting on fold and its seal (1).



Sample A2:

Bubbling on outside (1) of fold seal.

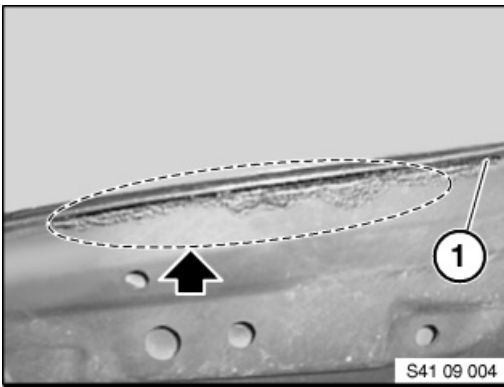
Note:

Bubbling between fold seal and outer edge. The fold seal covers an approx. 5 mm wide strip at the edge of the component.

Sample A3:

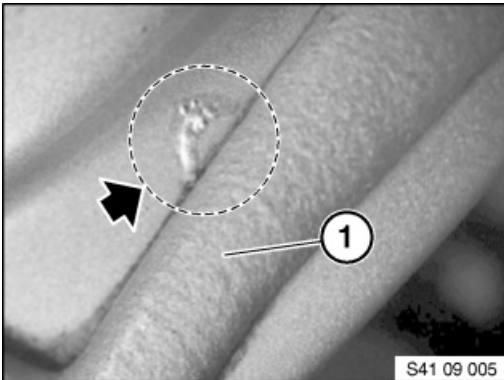
Bubbling on the inside of the fold seal (1) is more extensive than the width.





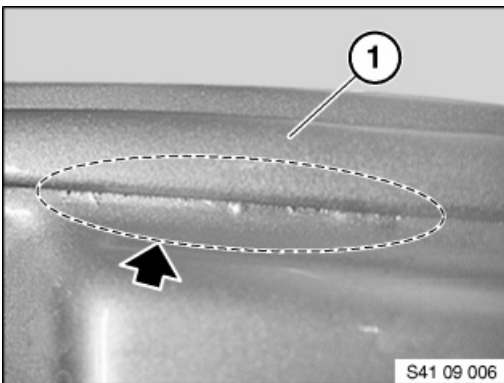
2. Min/max tolerance sample B (minor paintwork damage)

General appearance: Rust is **NOT** visible without scratching the surface.



Sample B1:

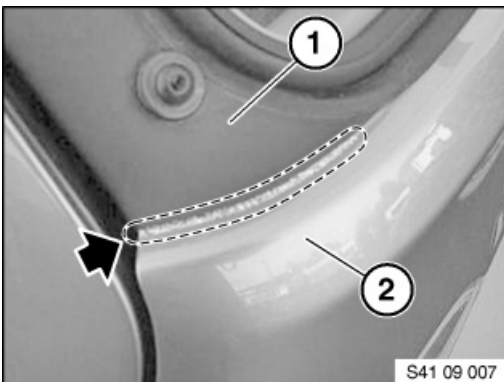
Bubbling on the inside of the fold seal (1) is less extensive than the width. Lengthwise distribution is less than the width of the fold seal (1).



Sample B2:

Bubbling on the inside of the fold seal (1) is less extensive than the width. Lengthwise distribution is greater than the width of the fold seal (1).

3. Min/max tolerance sample C (scrape marks)



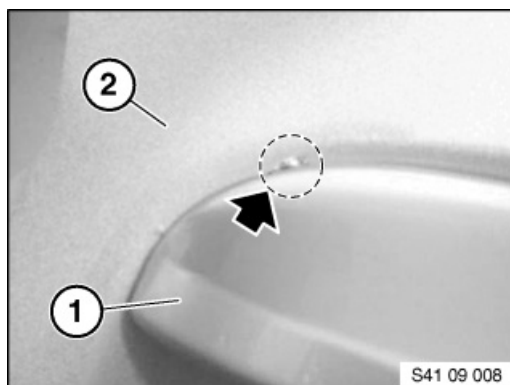
Sample C1:

Scrape marks on paint surface of the tailgate (2) by plastic trim (1) (only Touring).

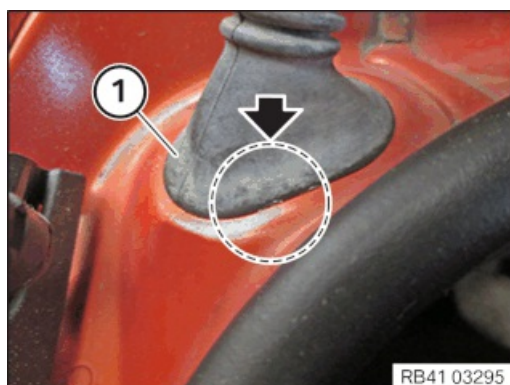
Sample C2:

Chafe marks on paint surface caused by tailgate handle strip (1) on tailgate (2).





3. Tolerance sample D (rubber grommets)



Formation of blisters is not visible without lifting the rubber grommet (1).

3. Min/max tolerance sample E (vehicle underbody)



Visible red rust formation originating from an edge or a spot-weld.

Procedure: The damage patterns are now differentiated based on min/max tolerance samples. The following extended warranty applies:

<u>Not for damage caused by customer</u>	<u>Period in years</u> <u>First registration after 1.1.2004</u>	<u>Selection of the repair method</u>
<u>Min/max tolerance sample A</u>	12	Component replacement if feasible in terms of time
<u>Min/max tolerance sample B</u>	3	Component replacement
<u>Min/max tolerance sample B</u>	from 3	<u>NO part exchange permitted. The approval regulations of the local market must be observed at all times.</u>
<u>Min/max tolerance sample C</u>	12	Paint



<u>Tolerance sample</u> <u>D</u>	12	Paint
<u>Min/max tolerance</u> <u>sample E</u>	12	Seal and preserve.

The paint structure must be built up as specified in the ColorSystem painting handbook.

Attention!

The repair is only carried out in justified case of customer complaint.

In the case of rust damage and paint damage, all mounted parts must be retained wherever possible and remounted as part of the repair procedure.

In contentious cases, e.g. repeated repairs, the advise of the respective Warranty department should be sought in order to clarify the procedure.



Dent repairs without damaging paintwork

All

Situation: Light dents have previously only been repaired through conventional means such as Multispot and filling followed by repainting.

However, methods of rectifying parking and hailstone damage that do not damage the paintwork are becoming increasingly common. Vehicle insurers are fully supportive and endorse this approach.

This procedure involves pressing out damage from the inside of sheet metal panels using levers followed by polishing. The total outlay is much lower than for conventional dent repairs with subsequent repair painting. It is to be noted here that some areas of damage cannot be reached on account of reinforced or bonded body components. For safety reasons, no additional holes may be drilled to improve accessibility.

The size of the dent should not exceed a diameter of 80 mm.

This procedure can also be used during general workshop repair processes, such as:

- Preparing for painting (reduction in filling work)
- Rectifying any damage following repair painting.

Based on this background as well as environmental aspects and the positive effect on insurance coverage classification, this method of repairing dents without paintwork damage is approved for BMW vehicles. This approval only applies to dents that do not have visible paintwork cracks.

Procedure: Repairing dents without damaging the paintwork requires continuous practice and a high degree of skill. In order to cater for the relevant situation at all contractual partners, two application methods for optimum use are offered.

1. In the same way as professional body and paintwork shops are already used, it is also possible in this case to commission qualified contractors for the purpose of conducting dent repairs without paintwork damage.
2. Purchase of a BMW pressing-out tool set for dent repairs.

The form and materials of this set have been carefully selected for BMW vehicles. It consists of a standard set (for approx. 80 % of the outer body skin that can be reached) and an extension set (for the remaining 20 %).

Training is recommended so that the tool set can be used effectively. This training is offered by external companies and can be conducted locally (e.g. for Germany the company Ur-Form).

See Service Information 5 04 98 (328).

Note:

Make sure that the training provider does not conduct training under the prerequisite of purchasing his particular set of pressing-out tools.



41 01 08 (452)

New BMW paint brochure

All

Presentation of BMW paint brochure:

The existing BMW paint brochure has been thoroughly revised and in its new form provides good reference for assessing all kinds of paint and corrosion damage.

The examples and detailed descriptions contained in the brochure are intended to find a standard language for identifying paint and corrosion damage. Unambiguous descriptions of damage mean that misinterpretations can be largely ruled out when assessing a possible warranty claim. Communication between the customer and the authorised BMW dealer during assessment on the vehicle is also made greatly easier.

If for example the following damage is unambiguously identified on the paint surface, this will always be considered to be the responsibility of the customer, and warranty will be ruled out:

- Mechanical influences on the paint surface (e.g. scratches)
- Damage to the paint surface caused by chemical or biological influences (e.g. animal droppings)

The new BMW paint brochure complements the BMW paint handbook when eliminating paint and corrosion damage. This means that the repair procedures described in the BMW paint handbook are adapted unambiguously and purposefully to the fault pattern.

Subsequent orders for BMW paint brochure:

The BMW paint brochure can be ordered via the usual parts-related channel under the BMW parts number 01 29 2 148 332.



New repair methods "Gluing / Riveting" on steel bodies

BMW/MINI

Situation: Advance technical developments in the field of adhesives and equipment technology have made modified repair methods possible. This procedure has been tested and approved following exhaustive endurance runs and corrosion tests in the Development division.

Similar to the procedure for the tail panel on the F01/F02, the repair methods "welding/soldering" will change to "gluing/riveting" on various outer skin and structural components of steel bodies from the launch of the E89 and R57. This procedure has already been introduced for repair work on the reduced-weight aluminium front end (GRAV) of the E60.

The repairs can be performed by all workshops that have participated in a GRAV or the current bonding and riveting training, in combination with the training video.

Another positive point of this method is the significantly improved corrosion protection resulting from the wide-area bonding of the spare part coating (KTL).

Procedure: Essentially, the following components are affected:

- Rear side wall
- Tail panel
- Boot floor
- Roof outer skin
- engine carrier
- support carrier

Model series affected:

- MINI (R55, R56, R57)
- BMW 1 Series (as of E8x)
- 3 Series (as of E9x)
- 5 Series (as of E60)
- X1 (E84)
- X5 (E70)
- X6 (E71)
- Z4 (E89)
- 7 Series (as of F01)

And all future series.

Necessary workshop equipment:

- Punch riveting tool
- Blind riveting tongs
- Cartridge gun for body glue
- Universal collet (for roof ducts)
- Infrared lamp

For more information on the required tools, see Service Information.

Parts required:

The new parts and consumables required for the respective scope of repair work are listed in the Electronic Parts Catalogue (EPC).

In addition, vehicle-specific service repair packages are also offered. Here, the vehicle identification number is to be entered in KSD2, the corresponding "Packages" button selected and the required job item selected in main group 41.

Repair instructions:

The repair instructions have been revised to take account of the new repair method:

To differentiate the individual repair methods, the repair stage is inserted in the repair instructions.



- Repair stage 1: All repairs that only provide for replacement of screwed/bolted components and planishing operations.
- Repair stage 2: Repairs that are carried out by bonding and riveting without the use of a straightening bench.
- Repair stage 3: Repairs that are carried out by bonding and riveting with the use of a straightening bench or welding.

Training video for bonding and riveting:

The new methods, for example "punch riveting", have been described on a training video that will be distributed to National Sales Companies.

Please make sure the training video is made available to the staff who will be performing this work and, if you do not perform body repair in your own workshop, to the staff of your specialist body workshop.

The BMW paint brochure can be ordered via the usual parts-related channel under the BMW parts number 01 69 0 037 577.

Time allowances:

Time allowances (flat rates) have been revised to take account of the new repair methods and shall apply retrospectively.



Repair of corrosion damage

All

Situation: A paint brochure is available for the evaluation and repair of body components relating to corrosion damage.

It contains examples for the definition of paint and corrosion damage and provides information on remedies and repairs. Details on contents and distribution were published in the Service Information (bulletin) 41 01 08 (452).

The procedure for chafe marks (e. g. tailgate repair) is described in detail in the vehicle-specific Service Information (bulletin).

Chafe mark on a painted surface generally are not considered to justify a part replacement.

Procedure: Important!

Repair of corrosion damage only if there is a specific customer complaint!

To the extent that the design allows, all add-on parts must be retained and converted.

Always adhere to the following procedure when dealing with corrosion damage:

1. Establish the fault pattern of the damaged area with the aid of the new paint brochure and use this as a basis to determine the repair measures.
2. Remove the partial area of the body as specified in the repair instructions.
3. Repair the partial area affected by corrosion in accordance with the repair instructions and the BMW paint manual.
4. Reassemble the vehicle using the removed add-on parts.

Note:

Only the following repairs of the body components may be invoiced.

- Replacement of the corroded body component (only in case of rust damage without partial repair)
- Paint
- Conversion of add-on parts
- Cavity preservation



31 01 12 (833)

Visible corrosion on vehicle add-on parts

Situation: Since the market introduction of the E65/66 the engine compartment and underbody preservation has successively been dropped from all series for environmental protection reasons. This may result in visible corrosion of machined surfaces such as, for example, on chassis/suspension components, machined screwing/bolting points, screw connections, or on surfaces such as, for example, the joints and drive shafts!

To prevent or re-treat this surface corrosion, the dealer organisation should use the corrosion protection with BMW part number 83 19 2 317 997.

Vehicles concerned: All BMW, MINI series

Procedure: Apply a thin coating of corrosion inhibitor (using only a brush) to the affected areas.

Warning!

Risk of fire!

Do not apply any corrosion inhibitor to the engine or the exhaust system!



Cleaning and care of leather in vehicles

All model series

Situation: The leather used by BMW is a high-quality natural product prepared using state-of-the-art processing techniques.

As it is a genuine natural product, its specific characteristics and peculiarities must be taken into account in its use and care.

Lengthy periods in direct sunlight (for convertibles) may lead to slight bleaching and loss of softness in the leather.

Regular cleaning and care are necessary, for dust and dirt from the road (leather's arch enemy) can penetrate the pores and folds, causing the leather to lose its visual appeal.

Affected vehicles: All BMW vehicles with leather finish

Action: As dirt and grease slowly attack the protective coating of the leather finish on a vehicle, treatment with BMW's premium leather care agent is needed once or twice a year, depending on the degree of soiling.

Here, the precleaned leather surfaces of the seats, door trims and dashboard can be cleaned and cared for in a **single work cycle**.

Procedure:

1. Preclean the leather surface with a microfibre cloth.
2. Thinly apply BMW's premium leather care agent with a soft, clean sponge (by-pack) (shake well before use). Rub into soiled areas more intensively.
3. Allow to dry and then rub down with a clean cloth (by-pack).

Note:

BMW premium leather care agent:

High-quality oils maintain the natural characteristics of the leather. The typical smell of leather is refreshed.

This product provides UV protection (combined leather cleaning and care agent). It was presented in September 1999 and has been available from BMW Parts Service since January 2002 in two different containers.

Important!

Work using BMW premium leather care agent cannot be reimbursed through warranty as this is a cleaning and care operation.

Parts:

<u>Part number</u>	<u>Description</u>	<u>Quantity</u>
83 12 0 411 413	Leather care kit with UV protection	1

Note:

Current contents and range of parts can be found in the spare parts catalogue.



51 01 00 (530)

Front licence plate holder

All models

Situation: Most BMW dealers use a licence plate backing panel with their company name for fitting the rear licence plate.

The same backing panel is also frequently used for the front licence plate.

Effect: Fitting such a backing panel to the front bumper is a contravention of licencing regulations 74/483 EEC as it does not meet the specification for protecting pedestrians.

Extract from EC Directive 74/483: "No protruding section of the exterior surface of the vehicle shall have a rounding-off radius of less than 2.5 mm".

The consequence is the invalidation of the German Federal Vehicle Homologation Approval and serious disadvantages for the BMW dealer in the event of litigation.

Moreover, the name of the dealership on the licence plate backing panel adjusts the height of the licence plate, so impeding the cooling air inlet and negatively affecting the cooling efficiency of the engine at high loads.

Affected vehicles: All models.

Procedure: Do not install a separate licence plate backing panel on the front bumper. The licence plate backing panel fitted **at the factory** corresponds to **all** requirements regarding safety, operation and styling.

Important! To prevent rattling noises being caused by the licence plate, the foam-rubber strips in the by-pack kit must be used as backing and attached double-sided to the licence plate and to the vehicle.

All necessary securing screws and white or coloured cover flaps can be found in the by-pack kit.

Parts: Standard licence plate backing panels and mounting components are listed according to model in the Electronic Parts Catalogue and can be ordered via the customary parts ordering channels.



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Regular cleaning and care are necessary, for dust and dirt from the road (leather's arch enemy) can penetrate the pores and folds, causing the leather to lose its visual appeal.

Affected vehicles: All BMW vehicles with leather finish

Action: As dirt and grease slowly attack the protective coating of the leather finish on a vehicle, treatment with BMW's premium leather care agent is needed once or twice a year, depending on the degree of soiling.

Here, the precleaned leather surfaces of the seats, door trims and dashboard can be cleaned and cared for in a **single work cycle**.

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Action: As dirt and grease slowly attack the protective coating of the leather finish on a vehicle, treatment with BMW's premium leather care agent is needed once or twice a year, depending on the degree of soiling.

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3. Allow to dry and then rub down with a clean cloth (by-pack).

Note:

BMW premium leather care agent:

High-quality oils maintain the natural characteristics of the leather. The typical smell of leather is refreshed.

This product provides UV protection (combined leather cleaning and care agent). It was presented in September 1999 and has been available from BMW Parts Service since January 2002 in two different containers.

Important!

Work using BMW premium leather care agent cannot be reimbursed through warranty as this is a cleaning and care operation.

Parts:

<u>Part number</u>	<u>Description</u>	<u>Quantity</u>
83 12 0 411 413	Leather care kit with UV protection	1

Note:

Current contents and range of parts can be found in the spare parts catalogue.



Cleaning and care of leather in vehicles

All model series

Situation: The leather used by BMW is a high-quality natural product prepared using state-of-the-art processing techniques.

As it is a genuine natural product, its specific characteristics and peculiarities must be taken into account in its use and care.

Lengthy periods in direct sunlight (for convertibles) may lead to slight bleaching and loss of softness in the leather.

Regular cleaning and care are necessary, for dust and dirt from the road (leather's arch enemy) can penetrate the pores and folds, causing the leather to lose its visual appeal.

Affected vehicles: All BMW vehicles with leather finish

Action: As dirt and grease slowly attack the protective coating of the leather finish on a vehicle, treatment with BMW's premium leather care agent is needed once or twice a year, depending on the degree of soiling.

Here, the precleaned leather surfaces of the seats, door trims and dashboard can be cleaned and cared for in a **single work cycle**.

Procedure:

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Note:

Current contents and range of parts can be found in the spare parts catalogue.



Measures for leather complaints (seats)

All model series

Situation: The leather used by BMW is a high-quality, state-of-the art processed natural product, whose quality level lasts for years with the appropriate care. Follow the instructions in the Service Information (bulletin) 51 02 02 (834) and the instructions in the Owner's Handbook on BMW Premium Leather Care. The BMW approved leather cleaners and care sets are to be used.

To maintain the high-quality leather prepared by BMW even after damage without replacement of the complete seat cover or the interior covering, BMW offers a leather repair kit. To perform leather repairs the "BMW appearance repair/ interior repair" Aftersales training is recommended.

Advantages for the customer: Part replacement can be avoided with cost-effective repairs of minor damage.

Advantages for the BMW dealer: Professional leather repair can increase the value of a vehicle. A repair is possible in approx. 60 to 80 minutes. Restrictions on the repair are with damages to seams.

Caution!

The marked "airbag seam" must not be repaired!

Despite very good results, new part quality can not be achieved. For damages which are the fault of the customer, it is advisable to exclude the warranty claims for this repair before applying the leather repair.

A repair is only carried out in justified case of customer complaint.

Note:

The leather repair requires permanent training and a high degree of manual dexterity. In order to meet the situations in all BMW Service authorised workshops, there are two application variants offered for optimal use:

1. Just as bodyshops and paint shops are used for body damages, there is also the possibility here, to engage a qualified local supplier for the leather repair.

POS Polsterservice GmbH is recommended in Germany.

Contact data:

POS Polsterservice GmbH

Mühlenpfad 2-4

53547 Hausen-Solscheid

Telephone: +49 (0) 2638 / 921-700 (for German, Austria and Switzerland)

Telephone: +49 (0) 5828 / 80755 (for Netherlands, Belgium and Luxembourg)

E-mail: vertrieb@polsterservice.de

E-mail: jvanderveen@polsterservice.de (for the Netherlands, Belgium and Luxembourg)

Internet: <http://www.polsterservice.de>

2. Use of the BMW leather repair set and its application after participating in the recommended Aftersales training "**BMW appearance repair/ interior repair**".

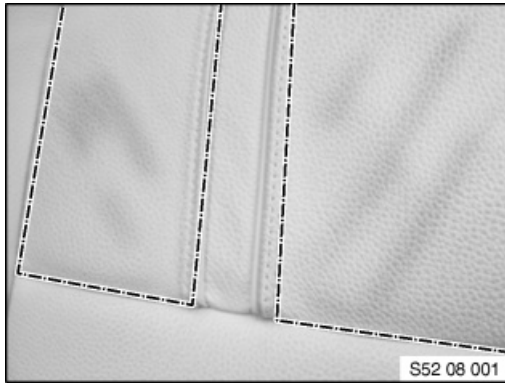
The following fault patterns belong to the most frequent complaints for leather upholstery:

1. Discolouration and dirt contamination
2. Wear
3. Scratches
4. Tears and cuts
5. Open seams
6. Ripples
7. Creasing (with and without rollover)
8. Leatherette crack

Affected vehicles: All BMW and MINI vehicles with leather option



Measure:



1. Discolouration and dirt contamination

Clothing (especially jeans and leather clothing in damp condition) can bleed colours onto the leather. Especially subject to this are special light coloured interior options

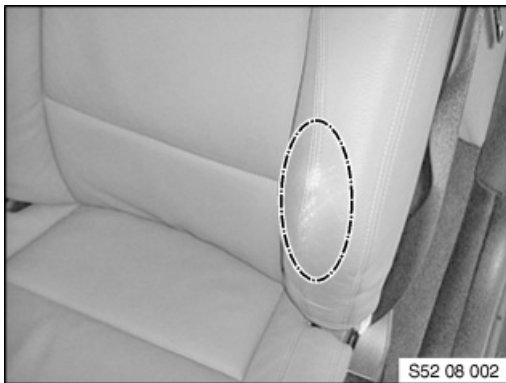
To prevent the leather from discolouration and dirt contamination, regular leather care is required (also refer to SI 510202834 and notes in the Owner's Handbook on leather care).

Using the care and cleaning set approved by BMW, these discolorations and dirt contaminations can be removed in most cases. If is no longer the case, because it is at an advanced stage, the dirt contamination has already penetrated into the leather.

Caution!

Work using BMW leather care kit is not reimbursed by the warranty as this is a cleaning and care operation.

Discolouration and dirt contamination resulting from lack of care are not a case of defect of the leather. In case of a customer complaint defective material must be proven and if necessary the part replaced.



2. Wear

Wear marks, e.g. on the seat bead, can occur by continual mechanical stress and the used geometries.

Regular care keeps the leather soft and protects from wear.

The effected location can be repaired with the aid of the BMW leather repair kit.

Only for repeated customer complaints is the effected part to be replaced.

Caution!

If again waiting for a repair is not successful, in case of repeated customer complaints the effected part must be repaired. The invoicing is to the warranty.

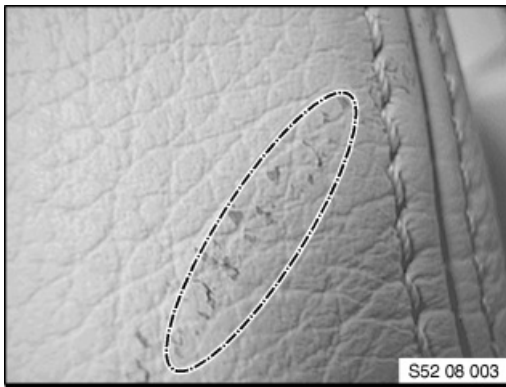
See billing procedures!

3. Scratches

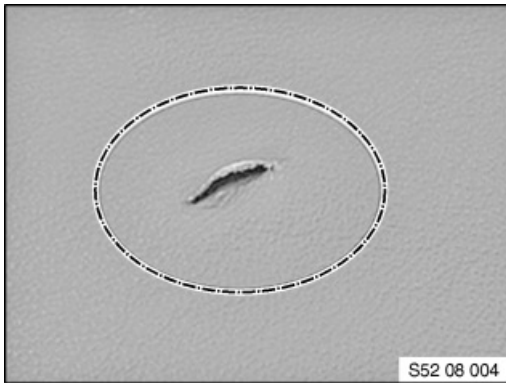
The leather surface is like scales. Obvious damages to the leather surface caused by pointed objects such as, belt,

buttons, keys or zippers.





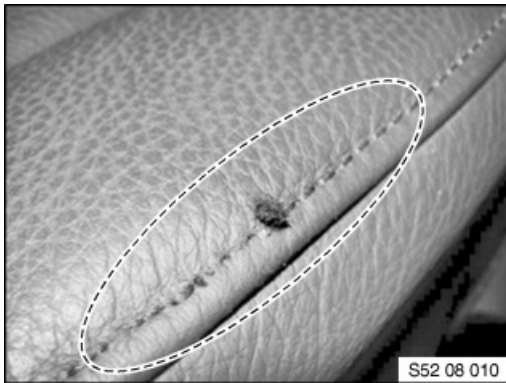
The fault pattern presents no product defect. The effected location can be repaired with the aid of the BMW leather repair kit.



4. Tears and cuts

Obvious completely cut leather caused by sharp objects, such as keys or knives.

The fault pattern presents no product defect. Replacement of cover necessary.



5. Open seams

Open seams -general

Damaged or open seams caused by pointed or sharp objects.

The effected spot can be repaired more economically by an external service provider.

Caution!

For damaged airbag seams (sewed in) on the cover of the seat backrest or the door trim panel, the effected part must be replaced.

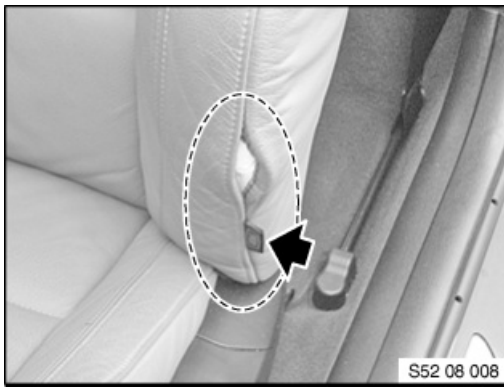
See billing procedures!

Open "airbag seam"

Caution!

The marked "airbag seam" must not be repaired!





6. Ripples

A ripple in the surface is completely designed to emphasise the natural character of the leather. The ripples in the leather can change due to fluctuations in temperature and humidity.

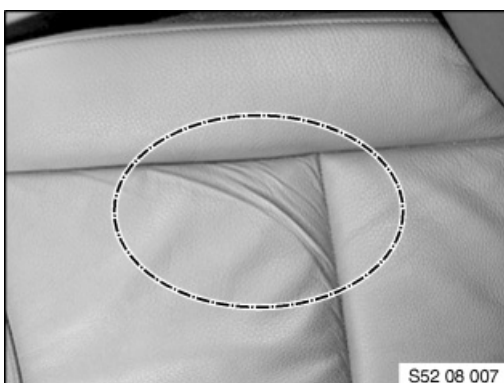
In case of customer complaints, the customer should be advised of the natural character and design of the leather upholstery. A treatment of the effected spot has no purpose.



7. creasing

Creasing without rollover of material

Depending on the cover design, the natural leather qualities (stretch) and the individual type of entering the vehicle, permanent creasing (without rollover of the material) of the seat cover can occur on the seat surface



Creasing with rollover of material

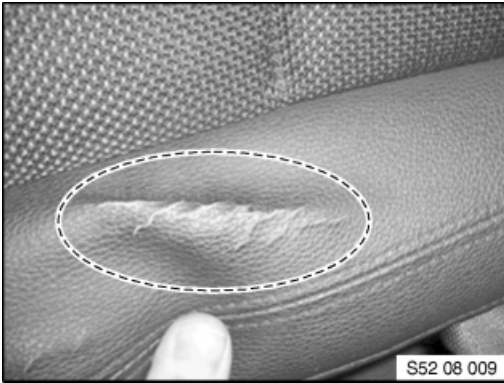
Heavy creasing (with rollover of material) on the seat surface is caused by extreme stress.

Caution!

- Creasing without rollover of material is not a defect of the leather. Part replacement on warranty is not justified.
- For creasing with rollover of material, in the case of customer complaint the effected part must be replaced on warranty.



To compensate for possible colour variations, the adjacent leather surfaces must be treated with the leather care kit.



8. Leatherette crack

Surface cracks in leatherette.

The underlying fabric structure is visible.

In case of customer complaints the effected part is to be replaced on warranty.

Pro-cedure: Effective immediately measures for leather complaints will be decided based on damage images.

1. In case of customer complaint, check if the leather surface can be repaired by care measures.
For the procedure, refer to Service Information (bulletin) 51 02 02 (834).
2. If there is damage of the leather in the case of customer complaint, for warranty claims convincing digital photos with the following contents must be made (similar to a paint complaint).

- **Total image of the damage location**
- **Detail image of the damage location**
- **Display the scale for size of damage spot with a ruler or a coin as reference**

Diagram and description of the damage location is retained in the vehicle records.

Acceptance of warranty costs depends on the evaluation of the leather damage.

3. Repair damaged spots according to the recommendations in the BMW appearance repair/interior repair Aftersales training or by a qualified service provider.

Billing procedures:

Caution!

The fault pattern 1 (Dirt contamination, discolouration), 3 (Scratches), 4 (Tears and cuts) and 6 (Ripples) are not a product defect of the leather. Part replacement on warranty is not justified.

Warranty

For leather repair work in case of warranty (e.g. wear) the invoicing is made according to working time (AZ) under the following job numbers:

BMW appearance repair passenger compartment Job number: 52 99 010

MINI appearance repair passenger compartment Job number: 52 99 020

Material and labour costs incurred can be claimed through the usual warranty channels subject to current warranty terms.

Parts:

<u>Part number</u>	<u>Description</u>	<u>Quantity</u>
83 12 0 411 413	Leather care kit with UV protection	1
83 12 0 411 371(USA only)	Leather care kit	1
83 12 0 415 497(Canada only)	BMW Premium Leather Care	1
83 12 9 407 907	Leather cleaning foam	1
83 19 2 162 184	Leather repair kit	1

Note:



Current contents and range of parts can be found in the spare parts catalogue.



Battery master document

All model series

Situation: The electrical system of BMW vehicles has been subject to an ongoing development process over the last few years. This has led to increased demands being placed on the battery. This document summarises all important information about how the battery should be handled in the dealership.

Procedure: The complaint "flat battery" can have various causes, most of which do not concern the battery itself. For that reason, replacing the battery will only very rarely provide a permanent solution to the problem. The cause must be properly analysed in order to perform a repair that actually rectifies the cause.

Below you will find list of the available auxiliary materials. These must be worked through step-by-step to investigate the problem. The documents listed can be accessed via hotspots.

1. Fault (cause) analysis (energy diagnosis)

Fundamentally, the following causes are possible for a breakdown resulting from a flat battery or problems in the vehicle's electrical power supply:

Vehicle faults

- Battery defective / alternator fault
- Vehicle does not "go to sleep"
- Vehicle keeps being woken up
- Excessive standby current

Operating error

- Side lights/parking lights/hazard warning flashers left on too long
- Terminal R/15 left on too long

Unreasonable driving/usage profile

An unreasonable driving profile (e.g. extremely short distances) or an unreasonable usage profile (e.g. too long immobilisation period, use of auxiliary consumers) represents a very frequent cause of running down the battery without there being a fault with the vehicle or battery.

If in these cases the battery is not charged sufficiently during driving, a charger must be connected during the immobilisation period (recommended chargers with cable permanently connected to battery, see BMW Group Parts).

Attention!

Do not connect the chargers to the 12 V charging socket on the vehicle side. The vehicle electrical system is thus prevented from "going to sleep" and the battery from being discharged.

The installation of a larger battery or an AGM battery can be used to rectify this (if an AGM battery has not yet been installed).

Customers who have no option to connect a charger to their vehicle during the immobilisation period are recommended, as the only alternative in reaching a state of charge that is too low, to travel distances of at least 10 km.

For the following vehicles the energy diagnosis test procedure must be worked through in the event of the complaint "flat battery":

- E65, E66, E67 from model year 03/2004,
- E60, E61, E63, E64, E70, E71, E72, E81, E82, E84, E87, E88, E89, E90, E91, E92, E93,
- All F Series from F01,
- BMW i
- All MINIs from R55,
- RR04,

Note:



The aim of energy diagnosis is to identify the most probable cause for a breakdown caused by a flat battery or for problems in the vehicle's electrical power supply. The causes listed above are stored in energy diagnosis.

To enable the applicant to use the correct defect code, make sure that both the customer's statement and the diagnosis results are adequately documented. These must be made available to the applicant.

Text search in ISTA or path: Function Structure > 03 Body > Voltage supply > Energy diagnosis

For all other model series:

For series without energy diagnosis, the customer shall be interviewed to make sure the operator errors described above can be ruled out as the cause of the battery discharging.

An on-board diagnosis is available to evaluate the battery condition of vehicles with intelligent battery sensor (IBS) or battery electronics (lithium ion battery):

- All BMW and MINI F series from series introduction
- Exception: F01, F02, F03 up to 09/2010, F04
- BMW i
- RR04

The following criteria are analysed to evaluate state of charge:

- Capacity loss
- Charge balance
- Complete discharges
- Operational energy capacity through automatic engine start-stop function (MSA)
- Water loss

The battery condition is determined for the following vehicles with intelligent battery sensor (IBS) by evaluation of the operational energy capacity and the voltage dip at engine start:

- all BMW E-series
- F01, F02, F03 up to 09/2010, F04
- all MINI R-series

For vehicles with automatic engine start-stop system, if this function is not fully available:

Important!

The prerequisite for invoicing a battery through the warranty channel is to work through the test module.

Energy diagnosis through to the diagnosis result:

- Displaying of cause
- Displaying of help instructions
- Displaying of corresponding diagnosis code

Exceptions are:

- Obvious battery damage and leakage
Use the correct defect code in such situations (61 21 00 49 or 61 21 00 01).
- Use of BMW Group Mobile Service and battery replacement on site to restore customer mobility as quickly as possible.

2. Measure closed-circuit current

Standby current check of the 12 V battery



BMW diagnosis system (functional description):

- E38, E39, E46, E53, E83, E85,

Path: Complete vehicle > Electric motor > Voltage and current control > Voltage and current supply > Standby current measurement

- E65, E66, E67,

Path: Complete vehicle > Body > Voltage supply > Voltage and current supply > Standby current measurement > Off-load current diagnosis

- E60, E61, E63, E64, E70, E71, E72, E81, E82, E84, E87, E88, E89, E90, E91, E92, E93,
- All F Series from F01,
- BMW i
- All MINIs from R55,
- RR04,

Path: Service functions > Body > Voltage supply > Standby current

3. Check alternator

Diagnosis system (functional description):

- All except E65, E66, E67,

Path: Complete vehicle > Electric motor > Voltage and current control > Voltage and current generation

- E65, E66, E67,

Path: Complete vehicle > Body > Voltage supply > Alternator

4. Battery replacement

In the following vehicles the new battery needs to be registered via the diagnosis system:

Always:

- E65, E66, E67,
- F80, F82, F83,

Providing an intelligent battery sensor (IBS) is fitted (depends on vehicle equipment):

- E60, E61, E63, E64, E70, E71, E72, E81, E82, E84, E87, E88, E89, E90, E91, E92, E93,
- All F Series from F01,
- BMW i
- All MINIs from R55,
- RR04,

Important!

If the new battery is not registered, incorrect readings may appear in the display of the on-board computer due to previous data in the power management system (check control message "Recharge battery" appears even though the battery is new).

Only AGM batteries should be installed in the following vehicles:

- E65, E66, E67,



- F01, F02, F03, F04, F06, F07, F10, F11, F12, F13, F18,
- BMW i
- Vehicles with auxiliary heater (SA536), intelligent generator control or automatic engine start-stop function.

Only lithium ion batteries should be installed in the following vehicles:

- F80, F82, F83

5. Battery charging

5.1 Charging the lead-acid-battery or the AGM battery

- The battery may only be recharged by means of chargers that have been approved by BMW and that have a constant charging voltage of **14.8 V**.
- If possible, the battery temperature should be between 15 °C and 25 °C during charging. Under these preconditions, the battery is adequately charged when the charge current drops below 2.5 amps.
- If the battery is recharged at lower temperatures, the process should not be ended until the charge current drops below 1.5 amps.
- On vehicles with IBS, recharging the battery directly at the battery terminals could lead to a misinterpretation of the battery condition and even unwanted Check Control messages or fault entries.
- If the battery is recharged while it is installed, it must be recharged using the jump start terminal points, whenever jump start terminal points are provided in the engine compartment. Only then can you be sure that recharging is correctly recognised by the vehicle electronics on vehicles with intelligent battery sensor (IBS).

Exception: MINI from R55: These vehicles do not have any jump start terminal points in the engine compartment.

On these vehicles, the positive terminal of the battery charger must be directly connected to the battery. On vehicles with a petrol engine, the negative terminal can be connected to the lifting eye (suspension lug) on the transmission and on vehicles with diesel engines to a flange on the engine bearing block on the engine.

5.2 Charging the lithium ion battery

Important!

The charging voltage that is generated by existing chargers that are designed for the lead-acid or AGM battery is too high for the lithium ion battery.

This excessive charging voltage may **in some cases** result in that **the separating switch** of the lithium ion battery **will be opened. This does not damage the lithium ion battery.** The separator switch will close again when a charging voltage of < 14 V is applied at the battery terminals.

Before charging a lithium ion battery, adjust the charging voltage of existing charger adapters once.

- The battery may only be recharged by means of chargers that have been approved by BMW and that have a constant charging voltage of **14.0 V**.
- If possible, the battery temperature should be between 15 °C and 25 °C during charging. Under these preconditions, the battery is adequately charged when the charge current drops below 2.5 amps.
- Do not charge lithium ion battery when temperature is below 5 °C!
- The lithium ion battery can be charged via **the jump start terminal points** in the engine compartment **as well as directly on the battery terminals**.

6. Charging the high-voltage battery

Charge high-voltage battery

E72, F04

Notes on charging the high-voltage battery on standing vehicles (new and used cars)

E72, F04



Notes on charging the high-voltage battery on standing vehicles
(new and used cars)

F01H, F02H, F10H, F30H

7. Notes on handling the high-voltage battery in the workshop

F01H, F02H, F10H, F30H

Eighth Additional publications of the subject of "Batteries"

AGM battery - brief component description

Notes on AGM battery

Information on intelligent battery sensor (IBS)

Notes on lithium ion battery

Notes on battery electronics (lithium ion battery)

Battery recharging intervals for stationary vehicles, battery charging
calendar and battery tag

12-V battery, high-voltage
battery unit

Battery log form (not for USA)

{Battery Log Form} (for USA only)

Notes on charging batteriesE65

Electronic battery master switch - all model series

Battery positive terminal with battery in luggage compartment, E36

System battery discharges, E38/3

Replace system battery, E38 M73

Checking electrical connection for secondary air pump, Z3



Battery recharging intervals for booth vehicles, battery charging calendars and battery tags (12-V battery, high-voltage battery unit)

All models

Situation: Due to the self-discharging of the vehicle battery (12 V battery, high-voltage battery unit) and vehicle standby current (if the vehicle battery was not disconnected from the vehicle electrical system), the vehicle battery is discharged slowly, but continuously.

If the vehicle battery is not recharged for an extended period of time, it will be damaged. This will result in a premature battery failure.

Measure: To maintain the quality of the vehicle battery in standing vehicles, it is necessary to recharge this vehicle battery regularly.

Procedure: Recharging intervals:
12V battery

All vehicles:

- 12-V battery connected to the vehicle electrical system: **6 weeks**

All vehicles without BMW i and Plug-in Hybrid (PHEV):

- Continuous disconnection of the 12-V battery from the vehicle electrical system by removal of the ground cable to the 12 V battery or by switching off of the fitted battery master switch, if installed:
12 weeks

High-voltage battery units:

- All vehicles: **6 weeks**
- Plug-in-hybrid (PHEV): as required

The recharging intervals follow the battery charging calendar.

Recharge when the colour of the calendar week on the battery calendar matches the colour of the battery tag. Battery tags are located on all new vehicles' interior mirror.

N.B.:

1. Since different systems are used by distribution channels for documentation, it is not always clear whether the vehicle battery was actually recharged during the week that is indicated. Therefore all recharge procedures must also be documented on the battery tag on the interior mirror (write date of recharge with a smudge-proof pen and confirm that the work has been carried out with your signature next to the date). The battery tag remains in the vehicle until the vehicle is handed over to the customer and is then filed with the vehicle records.
2. Dealers who store the vehicles externally (e.g. at freight forwarding businesses) are responsible for making sure that the vehicle batteries for these vehicles are recharged according to the battery charging calendar.
3. For vehicles in show rooms, the battery tags must be placed in the glove box. In the case of an increased draw on the charge (e.g. when doors are opened, the radio is turned on, electrical seat adjustment is operated), much shorter recharging intervals are required on these vehicles (e.g. every night) so that a total battery discharge is reliably avoided. It is however better to provide for charge compensation by means of a permanent support charge in the showroom.

"Trickle charger" SI 02 03 05 (205)

Parts:
Battery log form (not just for USA)
{Battery Log Form} (for USA only)



<u>Designation</u>	<u>Part number</u>	<u>Quantity</u>
<u>Battery tag, coloured</u>		
whisky	01 89 9 781 424	as needed
sun yellow	01 89 9 781 425	as needed
emerald	01 89 9 781 426	as needed
california blue	01 89 9 781 427	as needed
brick red	01 89 9 781 428	as needed
Grey	01 89 9 781 429	as needed



Automatic engine start-stop function

Manual gearbox

Situation: As a "BMW EfficientDynamics" measure, the automatic engine start-stop function (development code: Automatic Engine Start-Stop = MSA) helps to reduce fuel consumption and CO₂ emissions. The drive unit is switched off when the car halts e.g. at traffic lights, by engaging neutral and disengaging the clutch. To restart it, it is sufficient to operate the clutch pedal.

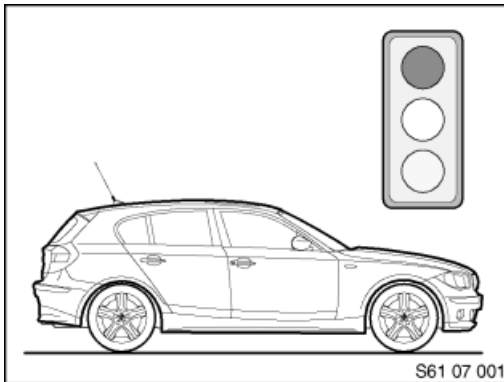
Vehicles concerned: Phased-in as from March 2007 in **manual gearbox** vehicles.

Note:

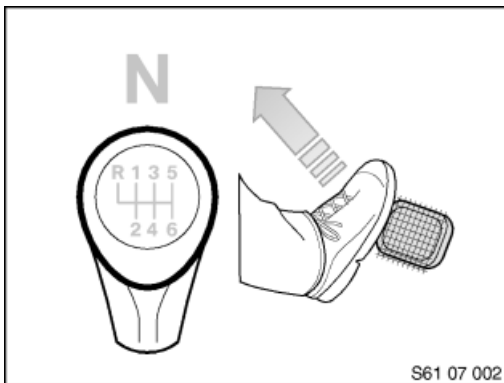
The automatic engine start-stop function is installed as standard on these vehicles.

Procedure: **Functional sequence ASSF (automatic engine start-stop function)**

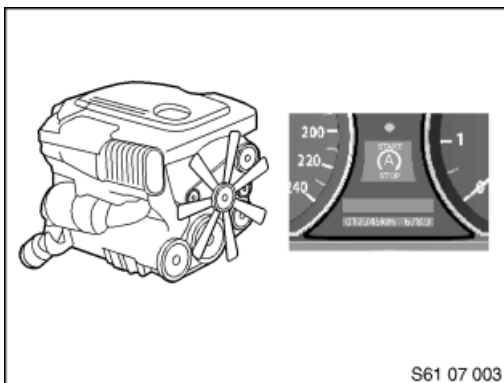
Engine shutdown



The driver brakes the vehicle to a standstill (e.g. at traffic lights).



The driver engages neutral and releases the clutch.



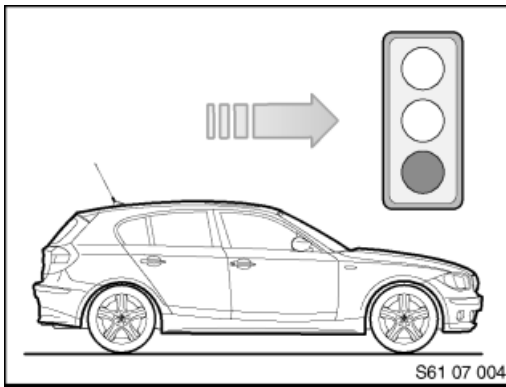
The engine cuts out automatically.

The "Start/Stop" symbol appears in the instrument panel (see "Display concept").

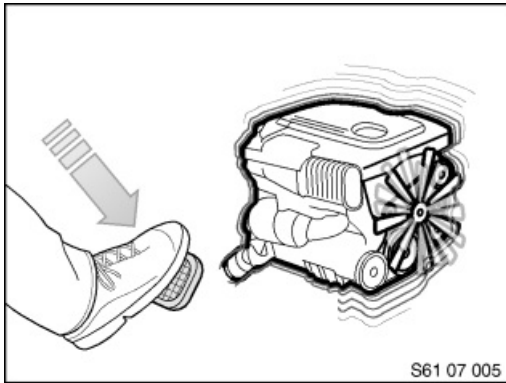
Engine start

The driver wishes to resume the journey.





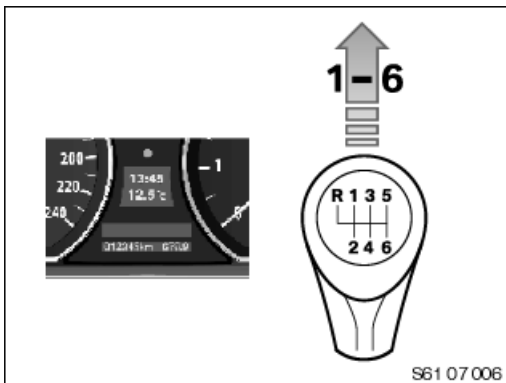
S61 07 004



S61 07 005

The driver presses the clutch pedal.

The engine starts.



S61 07 006

A gear can be engaged and the journey continued.

The "Start/Stop" symbol in the instrument panel goes out and the time and temperature appear (see "Display concept").

Prerequisites for an automatic engine shutdown

The automatic engine start-stop function will only stop or start the engine if certain conditions are met.

Engine shutdown

The engine is switched off when:

- The vehicle is stationary (speed < 3 km/h).
- The vehicle has been driven at > 5 km/h since the engine was last stopped.
- The vehicle has been driven at 5 km/h since the last change at terminal 15.
- The manual gearbox is in neutral.
- The clutch pedal is not pressed and the steering wheel not turned (steering wheel must be aligned straight).
- The engine speed is virtually at idle speed.

Engine start (with action by the driver)

The engine can be restarted by the driver with the aid of the automatic engine start-stop function if the driver actively intervenes by pressing the clutch pedal down fully (or pressing the START-STOP button).

Following this action by the driver, the engine will only start if the gearbox or transmission is in the neutral position and the drive train is not engaged.

Engine start (without action by the driver)

Without active intervention by the driver it may be necessary for the engine to be started (See also "Switch-on prompts")



The engine starts without any action on the driver's part if:

- The vehicle starts to roll (forwards or reverse).
- The brake pressure falls below a defined threshold value.
- The battery charge falls below a particular threshold value.
- The condensation sensor detects condensation on the windscreen (IHKA).
- With the air conditioning compressor switched on, the evaporator temperature rises above a particular threshold value.

Note:

The aforementioned criteria apply only to the automatic engine start-stop function, in other words, not if the engine has been switched off with the SST (START-STOP button).

Switch-off inhibitors and switch-on prompts

Besides its main function of propelling the vehicle, the internal combustion engine has to provide other auxiliary functions.

These auxiliary functions are necessary for maintaining operating safety and convenience functions and complying with emissions requirements.

Certain conditions are therefore governed by switch-off inhibitors and switch-on prompts, either preventing the engine from being stopped or prompting its restarting.

Note:

The customer should be alerted to possible switch-on prompts (engine starts without customer's intervention)!

If for instance the evaporator temperature with the air conditioning is above a certain threshold value, this may serve as a switch-off inhibitor or switch-on prompt.

Switch-off inhibitors

The engine continues to run even though the gear lever is in the idle position and the clutch pedal has been fully released.

The following conditions act as switch-off inhibitors and prevent the engine from shutting down:

- Air conditioning requirements:
 - Automatic air conditioning: MAX AC button pressed
 - Automatic air conditioning: Defrost button pressed (request to defrost the windscreen)
 - Air conditioning system: high blower speed and low blower temperature, compressor button pressed
 - Air conditioning system: high blower speed and air distribution directed to windscreen, compressor actuated
 - Ambient temperature $\leq 3\text{ °C}$ and with air conditioning activated $> 30\text{ °C}$
- Engine coolant temperature below a particular value (depending on engine version approx. $20 - 50\text{ °C}$)
- Carbon canister needs purging
- Engine speed $> 900\text{ rpm}$
- Battery condition:
 - State of charge too low
 - Measured battery state of charge not plausible
 - Battery temperature too high (approx. 50 °C)
 - Starting voltage drop from previous ASSF start too low
- Partial vacuum in brakes not low enough
- Steering wheel movements by the driver
- Vehicle rolling

Switch-on requesters

The switch-on prompt is regarded as an automatic engine start and depends on the following conditions:

- Battery condition - battery charge too low
- Air conditioning requirements - cooling
- Partial vacuum in brakes not low enough
- Vehicle starting to roll.



Special features of switch-off inhibiting and switch-on request

Battery condition and on-board power supply

The battery condition is a key factor influencing whether switch-off inhibiting and/or switch-on requests are set. The battery condition is calculated in the APM (Advanced Power Management). This function is integrated into the engine control (see energy management) and has been specifically extended for the automatic engine start-stop function.

The aim is to permit reliable starting of the combustion engine after a defined immobilisation period, in terms of the on-board power supply. Before the combustion engine is switched off, a reliable prediction of the minimum usable, absolute residual capacity and the minimum voltage level in a subsequent hot start is made. The APM calculates the condition of the electrical on-board power supply based on the battery condition.

If the battery's charge condition drops into the red zone after the engine has been switched off by the automatic engine start-stop function, the automatic engine start-stop function starts the engine.

Air conditioning requirements (heating mode / air conditioning operation)

If the coolant temperature is well below the target outlet temperature (heating-up mode), this is treated as a switch-off inhibitor. In the heating mode, the electric auxiliary water pump (N47) and electric main water pump (N43) are activated upon an ASSF engine shutdown. This is prompted by the heating and air conditioning controls via the bus system.

In the event of an ASSF engine shutdown, climatic comfort may be reduced (formation of humidity/odours) because the air conditioning compressor is not running and consequently delivers no cooling power.

If the evaporator temperature rises above a threshold value during the ASSF engine shutdown when the air conditioning is switched on, this is treated as a switch-on prompt and the engine starts automatically.

If the condensation sensor measures a value that suggests condensation, with the automatic air conditioning switched on, the automatic engine start-stop function is suppressed (switch-off inhibiting). If this occurs during an ASSF engine shutdown, a switch-on request is issued.

Insufficient braking pressure

To ensure that there is always sufficient braking effect (including when the engine is shut down), the partial vacuum in the brake servo must always be monitored. If necessary, the engine is started automatically as soon as the partial vacuum falls below 500 hPa during an ASSF engine stop.

Steering servo

The engine will not be switched off for as long as the steering wheel is being turned. Steering servo is always assured. Only when the automatic engine start-stop function ceases to identify any movement of the steering wheel via the steering column switch cluster can the engine be switched off. This information is provided via the bus system.

Safety requirements

- Protection against automatic engine starting while working in the engine compartment:

If the bonnet is opened, the automatic engine start-stop function is deactivated to prevent an automatic engine start while working in the engine compartment.

- Renewed starting is always possible via the start/stop button.
- The automatic engine start-stop function can be reactivated after the bonnet is closed and either the engine has been started or a speed of > 5 km/h has been reached.
- Protection if the vehicle is left

If the driver leaves the vehicle, the automatic engine start-stop function is deactivated to prevent the engine from starting automatically.

The driver's seat belt buckle is monitored to this end.

The automatic engine start-stop function is deactivated when the driver's seat belt buckle is released. An ASSF engine shutdown is only permitted again once it has been identified that the driver's seat belt buckle is fastened and either the engine has been restarted or a speed of > 5 km/h has been reached once (only switch-off inhibitor).

The status of the seat belt buckle switch is indicated by the safety system via the bus system.

Important!

Even if the seat belt is not fastened and the bonnet is open, the engine can still start if the vehicle's speed exceeds 5 km/h.



Protection when vehicle moving

An engine shutdown must never take place while the vehicle is moving. An engine shutdown is only possible at a speed of less than 3 km/h.

There is also a protective feature to prevent an automatic engine start with the power transmission engaged. If the drive train is engaged on a vehicle, an automatic engine start is prevented. The zero-position sensor in the transmission monitors whether or not power transmission has been interrupted.

System-related deactivation of the automatic engine start-stop function

The Auto Start Stop function may also be deactivated for system-based reasons (the engine remains off). This is indicated to the driver by a CC message in the dashboard when a start is requested. There may be the following reasons for system-based deactivation:

- Set belt buckle signal
- Engine compartment lid contact switch
- Engine emergency running
- Implausible sensor or bus signals when vehicle tow-started.
- Ignition key is no longer detected (Comfort Access).

Note:

- Engine running and key taken out of vehicle - no ASSF engine shutdown
- Engine in ASSF engine shutdown status and key taken out of vehicle - no ASSF engine start

The engine can only be started by the driver pressing the start/stop button.

Deactivation via a safety function

If the Auto Start Stop function is deactivated by a safety function during an ASSF engine stop, the engine can only be restarted via the start/stop button and from a speed of 5 km/h.

Deactivation by system fault (emergency-run concept)

If a fault is detected in the system network of the automatic engine start-stop function (signal inputs, bus signals etc.), a switch-off inhibitor is set or the automatic engine start-stop function deactivated.

Fault recognition while the engine is running thus prevents any subsequent engine stops by the automatic engine start-stop function. In the event of a fault recognition in an engine stopped by the automatic engine start-stop function, a distinction is made between the following instances.

1. If safety-relevant faults are identified (fault in zero-position sensor, brake vacuum sensor, clutch sensor, enable line, engine compartment lid contact switch or driver's seat belt buckle), the automatic engine start-stop function is deactivated immediately and an automatic ASSF engine start is no longer permitted.
2. If other faults (DME/DDE emergency operation, etc.) that are not safety-critical are identified, the next ASSF engine start is still permitted. No further ASSF engine shutdowns are permitted.
3. The automatic engine start-stop function is disabled in the event of faulty bus communication with the DME/DDE engine control.

Note:

If the automatic engine start-stop function is deactivated by a system fault, a CC message (ID397) is flashed up in the instrument panel (see display concept).

Deactivation by external factors

If the seat belt buckle or bonnet are opened during an ASSF engine stop, the automatic engine start-stop function is deactivated and an engine start is only possible with the Start/Stop button or from a speed of > 5 km/h. If the driver attempts to start the engine by pressing the clutch pedal, the CC message ID450 is flashed up after 1 to 2 seconds (see "Display concept").

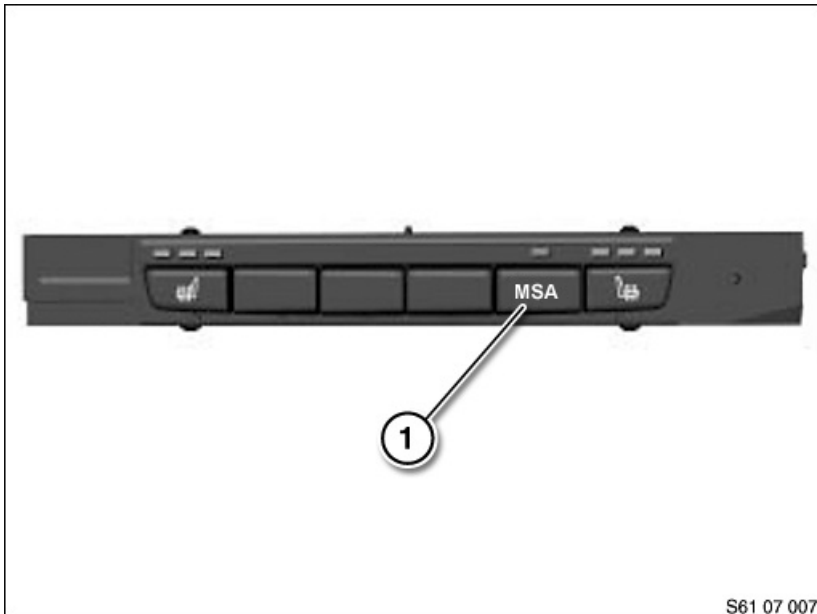
Deactivation by ASSF button

Note:

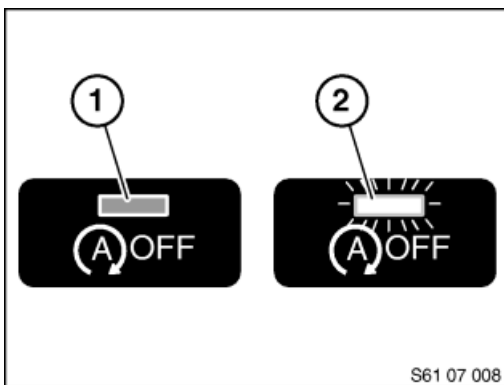
The graphic shows the pushbutton (1) still showing the development code MSA (Automatic Engine Start-Stop).



For correct designation, see under "Pressing the ASSF button"



The automatic engine start-stop function can be deactivated manually with the ASSF button (1). The automatic engine start-stop function is activated with every terminal change (terminal 15 on) and with the engine stationary or if the ASSF button (1) is pressed repeatedly. The signal from the ASSF button (1) is read in by the IHKA and passed on to the engine control. The indicator light in the ASSF button (1) is actuated by the IHKA.



Pressing the ASSF button:

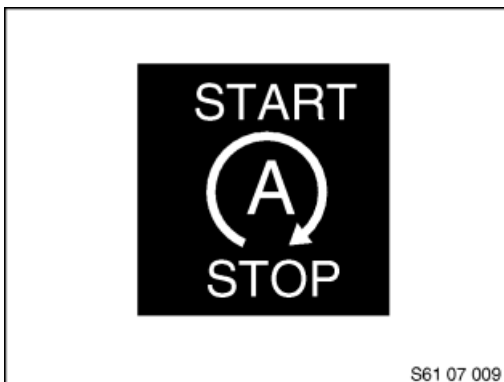
ASSF button not pressed (1) - LED off

ASSF button pressed (2) (the automatic engine start-stop function can be deactivated at the customer's request) - LED on.

The automatic engine start-stop function is active each time the engine has been restarted.

Display concept

The following displays are used in conjunction with the automatic engine start-stop function:



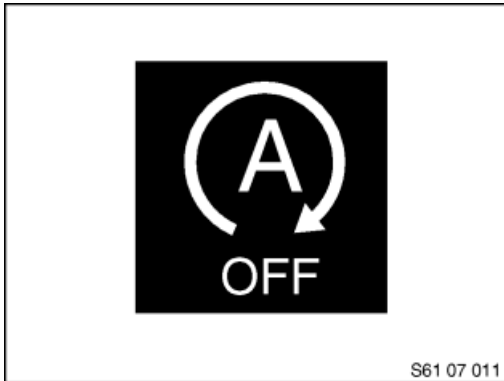
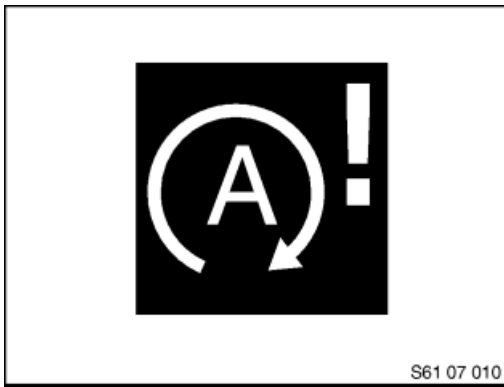
If the engine can be started via the ASSF function, this status is indicated permanently in the instrument panel.

If the customer wishes to display the temperature and time, they can change over the display by pressing the BC roller.

If there is a fault in the ASSF hardware that causes the automatic engine start-stop function to be deactivated, a CC message is displayed.

Text of CC message: "Automatic Start/Stop failure" (ID397).





If the automatic engine start-stop function is deactivated in order to assure operational reliability ("seat belt buckle unfastened"), a further CC message is displayed as soon as there is a switch-on prompt.

Text of CC message: "Automatic Start/Stop failure" (ID450).

Notes for Service department

The automatic engine start-stop function will only operate under certain conditions.

The function includes an automatic feature that examines the safety and comfort-based conditions that govern an engine start or engine shutdown.

Note:

In the event of customer queries, always check these conditions against the Checklist in Annex 1.

Important!

If the engine compartment lid contact switch is over-extended (workshop mode), the information "switch closed" is given. The automatic engine start-stop function is active.

An automatic engine start is possible.

Terminal 15 is automatically switched off via the signal from the door contact by opening or closing the driver's door with ASSF deactivated (e.g. "seat belt unfastened") and the driving lights switched off.

Terminal 15 can be permanently switched on again by subsequently pressing the START-STOP button.

Perform this process before the vehicle programming or diagnosis.

The automatic engine start-stop function is dependent on information from the energy management. In the event of the battery being changed or after every flashing process, the reference data on the charge and quality status of the battery may be lost. They will only be available again after a teach-in period of approx. 6 hours (bus system must be in sleep mode). The automatic engine start-stop function cannot be activated during this teach-in phase for reasons of reliability.

Faults stored in the ASSF system fundamentally result in the automatic engine start-stop function being deactivated. Before renewing parts, always perform a functional check to exclude the possibility of a malfunctioning sensor!

After working on vehicles with the automatic engine start-stop function involving one of the following actions, the automatic engine start-stop function is switched off until the new standby current/battery parameters have been learned.

In the following instances, the customer's attention should be drawn to the delay until the next ASSF engine shutdown:

- After disconnecting the battery
- After programming the engine control (note exceptions).



Be sure to observe the safety precautions when working on vehicles with automatic engine start-stop function! Before performing work on the engine, always make sure that the automatic engine start-stop function is switched off to prevent an automatic engine start while working in the engine compartment!

The automatic engine start-stop function is deactivated by:

- ASSF button
- Seat belt buckle
- Engine emergency running
- Open the engine hood

In most test modules in which individual component functions and/or lines are checked rather than the automatic engine start-stop function, the automatic engine start-stop function is switched off until the next terminal change for reasons of safety. This takes place automatically, i.e. a job that temporarily deactivates the automatic engine start-stop function is performed without the Service technician being able to influence events.

Important!

In the event of a fault in the seat belt buckle, engine compartment lid contact switch or ASSF button, the automatic engine start-stop function is not deactivated automatically. This could potentially result in the engine starting automatically while servicing work is being carried out in the engine compartment.

Be sure to observe the safety precautions when working on vehicles with automatic engine start-stop function!

To prevent an automatic engine start while working in the engine compartment, always make sure that the automatic engine start-stop function is switched off via "Deactivate ASSF button/release seat belt buckle and bonnet".

If it cannot be guaranteed that the automatic engine start-stop function is switched off, for reasons of safety it is prohibited to continue working.



Automatic engine start-stop function

Automatic transmission, twin-clutch gearbox

Situation: As a "BMW EfficientDynamics" measure, the automatic engine start-stop function (development code: Automatic Engine Start-Stop = MSA) helps to reduce fuel consumption and CO₂ emissions. The combustion engine is switched off and on automatically under certain conditions.

Vehicles concerned: The automatic engine start-stop function will be phased in as from 04/2010 in connection with the twin-clutch gearbox in the M3 (E9x) and automatic transmission in the F04.

Note:

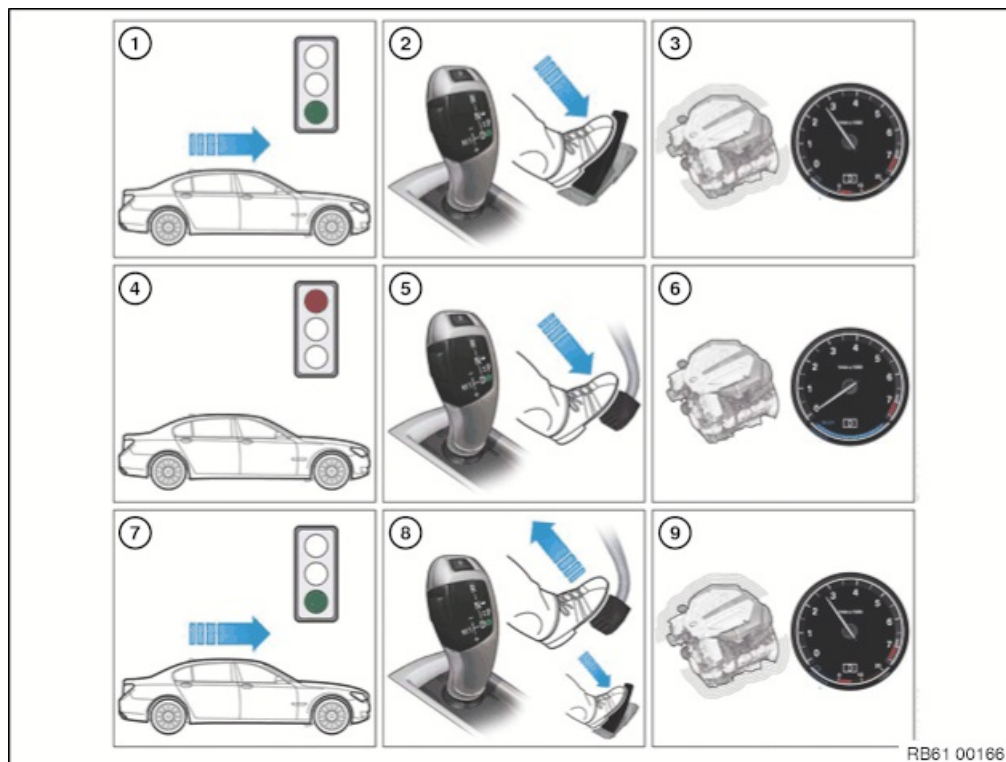
The automatic engine start-stop function is also installed as standard on these vehicles.

Procedure: *Note:*

The following description only deals with variations and special features compared to the automatic engine start-stop function already known for the manual gearbox. Further detailed information on the automatic engine start-stop function can be found in the following documents:

- Safety information for working on vehicles with automatic engine start-stop system (MSA)
- Service Information "Automatic engine start-stop function (manual gearbox)", SI number 610107335
- Functional description Automatic engine start-stop function (MSA), 2nd generation

Functional sequence ASSF (automatic engine start-stop function)



Index	Explanation	Index	Explanation	Index	Explanation
1	Vehicle moving.	2	Gear selector switch in position "D". Driver presses accelerator pedal.	3	Combustion engine running.



4	Vehicle is decelerated down to standstill.	5	Gear selector switch remains in position "D". Driver presses the brake pedal to decelerate and bring the vehicle to a standstill.	6	Combustion engine is switched off after 1 second. Rev counter shows "0".
7	The driver wishes to resume the journey.	8	Gear selector switch remains in position "D". Driver takes foot off brake pedal and then presses the accelerator pedal.	9	Combustion engine starts up.

Prerequisites of an automatic engine shutdown

The automatic engine start-stop function will only stop or start the engine if certain prerequisites are met.

Engine shutdown

The engine is switched off when:

- The vehicle is stationary (speed < 0 km/h).
- The engine speed is virtually at idle speed.
- The vehicle has been driven at > 10 km/h since the engine was last shut down.
- The vehicle has been driven at 10 km/h since the last change at terminal 15.
- The brake is pressed.
- Steering wheel movement is not moved. Steering wheel must be aligned straight.

Engine start

The engine is started automatically when:

- Brake pedal is released or the accelerator pedal is pressed.

Note:

The aforementioned criteria apply only to the automatic engine start-stop function, in other words, not if the engine has been switched off with the SST (START-STOP button).

Switch-off inhibitors and switch-on prompts

Besides its main function of propelling the vehicle, the internal combustion engine has to provide other auxiliary functions.

These auxiliary functions are necessary for maintaining operating safety and convenience functions and complying with emissions requirements.

Certain prerequisites are therefore governed by switch-off inhibitors and switch-on prompts, either preventing the engine from being shut down or prompting an engine restart.

Note:

The customer should be alerted to possible switch-on prompts (engine starts without customer's intervention)!

Switch-off inhibitors

The engine continues running although the vehicle is at standstill and held with the brake pedal.

The following preconditions act as switch-off inhibitors and prevent the engine from shutting down:

- Engine adaptation (e.g. cylinder adjustment)
- Regeneration of the diesel particulate filter
- Carbon canister needs purging
- Insufficient knock resistance of fuel
- Engine fault
- Engine coolant temperature
 - below a defined value (depending on engine version approx. 20 - 60 °C)
 - above a defined value (depending on engine version approx. 100 - 130 °C)
- Automatic transmission not ready



- Gearbox adaptation active
- Drive position “S”, “M”, “N”, “R”
- Driving surface incline too great
- Assist system active (Active Cruise Control, Parking Assist, Hill Descent Control)
- Stop-and-go driving
- Last MSA stop was too long
- Air conditioning requirements:
 - Automatic air conditioning: MAX AC button pressed
 - Automatic air conditioning: Defrost button pressed (request to defrost the windscreen)
 - Air conditioning system: high blower speed and low blower temperature, compressor button pressed
 - Air conditioning system: high blower speed and air distribution directed to windscreen, compressor actuated
 - Ambient temperature $\leq 3\text{ }^{\circ}\text{C}$
- Engine speed $> 1200\text{ rpm}$
- Battery condition:
 - State of charge too low
 - Measured battery state of charge not plausible
 - Battery temperature too high (approx. $50\text{ }^{\circ}\text{C}$)
 - Starting voltage drop from previous ASSF start too low
- Vehicle rolling

Hybrid cars:

- High voltage power management: Temperature too low or too high
- Load on vehicle electrical system too high
- High-voltage battery unit: State of charge too low or too high
- Hybrid system fault

Switch-on requesters

The following preconditions result in an engine start:

- Vehicle starting to roll
- Steering wheel turned
- Switching the drive position (to “S”, “M”, “N”, “R” with automatic transmission; “S”, “D”, “N”, “R” with DKG; “N”, “R” with DKG M3 US version)
- Power management: State of battery charge too low, battery temperature too high, power requirement of active electrical loads too high
- Air conditioning requirements - cooling
- Partial vacuum in brakes not low enough

Hybrid cars:

- High voltage power management: Temperature too low or too high
- Load on vehicle electrical system too high
- High-voltage battery unit: State of charge too low or too high
- Hybrid system fault

Safety requirements

Following preconditions **deactivate** the automatic engine start-stop function:

- Engine compartment lid is raised.
- Driver leaves vehicle: Secured by door contact, seat belt buckle and brake pedal
- Vehicle towed away
- Ignition key is no longer detected
- MSA button
- Battery not learned (battery data may be lost after changing the battery, disconnecting the battery or programming the engine control)



Note:

Renewed starting is always possible via the start/stop button.

Important!

Even if the seat belt is not fastened and the bonnet is open, the engine can still start if the vehicle's speed exceeds 5 km/h.

ASSF button

Note:

No Start/Stop button is fitted in the F04. On this vehicle, the automatic engine start-stop function is an integral part of the high voltage system.

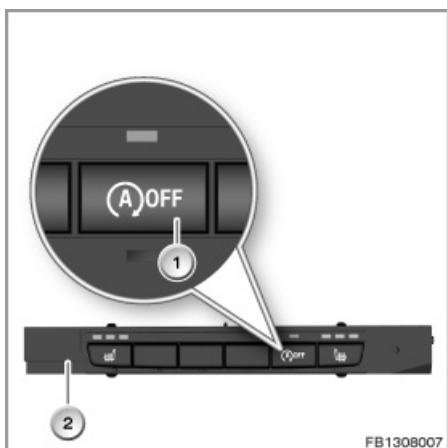
New generation ASSF button:



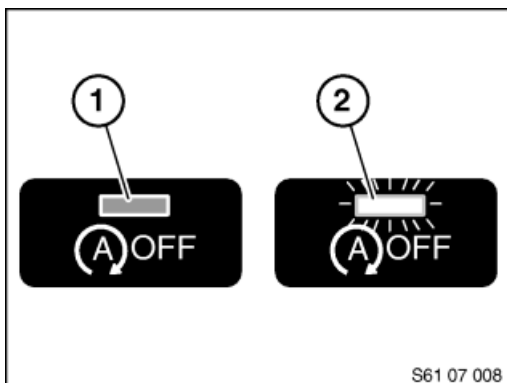
The ASSF button (2) is arranged below the Start/Stop button.

The automatic engine start-stop function can be deactivated manually with the ASSF button (2). The automatic engine start-stop function is activated with every terminal change (terminal 15 on) and with the engine stationary or if the ASSF button (2) is pressed repeatedly.

ASSF button on the M3 (E9x):



On the M3, the ASSF button (1) is integrated in the centre console control panel (2).



Pressing the ASSF button:

ASSF button not pressed (1) - LED off

ASSF button pressed (2) The Auto Start Stop function is deactivated at the customer's request - LED on.

The Auto Start Stop function is active each time the engine has been restarted.



Notes for Service department

The Auto Start Stop function will only operate in certain conditions.

The function includes an automatic feature that examines the safety and comfort-based conditions that govern an engine start or engine stop.

Note:

In the event of customer queries, always check these prerequisites against the Checklist in Annex 1.



Battery master document

All model series

Situation: The electrical system of BMW vehicles has been subject to an ongoing development process over the last few years. This has led to increased demands being placed on the battery. This document summarises all important information about how the battery should be handled in the dealership.

Procedure: The complaint "flat battery" can have various causes, most of which do not concern the battery itself. For that reason, replacing the battery will only very rarely provide a permanent solution to the problem. The cause must be properly analysed in order to perform a repair that actually rectifies the cause.

Below you will find list of the available auxiliary materials. These must be worked through step-by-step to investigate the problem. The documents listed can be accessed via hotspots.

1. Fault (cause) analysis (energy diagnosis)

Fundamentally, the following causes are possible for a breakdown resulting from a flat battery or problems in the vehicle's electrical power supply:

Vehicle faults

- Battery defective / alternator fault
- Vehicle does not "go to sleep"
- Vehicle keeps being woken up
- Excessive standby current

Operating error

- Side lights/parking lights/hazard warning flashers left on too long
- Terminal R/15 left on too long

Unreasonable driving/usage profile

An unreasonable driving profile (e.g. extremely short distances) or an unreasonable usage profile (e.g. too long immobilisation period, use of auxiliary consumers) represents a very frequent cause of running down the battery without there being a fault with the vehicle or battery.

If in these cases the battery is not charged sufficiently during driving, a charger must be connected during the immobilisation period (recommended chargers with cable permanently connected to battery, see BMW Group Parts).

Attention!

Do not connect the chargers to the 12 V charging socket on the vehicle side. The vehicle electrical system is thus prevented from "going to sleep" and the battery from being discharged.

The installation of a larger battery or an AGM battery can be used to rectify this (if an AGM battery has not yet been installed).

Customers who have no option to connect a charger to their vehicle during the immobilisation period are recommended, as the only alternative in reaching a state of charge that is too low, to travel distances of at least 10 km.

For the following vehicles the energy diagnosis test procedure must be worked through in the event of the complaint "flat battery":

- E65, E66, E67 from model year 03/2004,
- E60, E61, E63, E64, E70, E71, E72, E81, E82, E84, E87, E88, E89, E90, E91, E92, E93,
- All F Series from F01,
- BMW i
- All MINIs from R55,
- RR04,

Note:



The aim of energy diagnosis is to identify the most probable cause for a breakdown caused by a flat battery or for problems in the vehicle's electrical power supply. The causes listed above are stored in energy diagnosis.

To enable the applicant to use the correct defect code, make sure that both the customer's statement and the diagnosis results are adequately documented. These must be made available to the applicant.

Text search in ISTA or path: Function Structure > 03 Body > Voltage supply > Energy diagnosis

For all other model series:

For series without energy diagnosis, the customer shall be interviewed to make sure the operator errors described above can be ruled out as the cause of the battery discharging.

An on-board diagnosis is available to evaluate the battery condition of vehicles with intelligent battery sensor (IBS) or battery electronics (lithium ion battery):

- All BMW and MINI F series from series introduction
- Exception: F01, F02, F03 up to 09/2010, F04
- BMW i
- RR04

The following criteria are analysed to evaluate state of charge:

- Capacity loss
- Charge balance
- Complete discharges
- Operational energy capacity through automatic engine start-stop function (MSA)
- Water loss

The battery condition is determined for the following vehicles with intelligent battery sensor (IBS) by evaluation of the operational energy capacity and the voltage dip at engine start:

- all BMW E-series
- F01, F02, F03 up to 09/2010, F04
- all MINI R-series

For vehicles with automatic engine start-stop system, if this function is not fully available:

Important!

The prerequisite for invoicing a battery through the warranty channel is to work through the test module.

Energy diagnosis through to the diagnosis result:

- Displaying of cause
- Displaying of help instructions
- Displaying of corresponding diagnosis code

Exceptions are:

- Obvious battery damage and leakage
Use the correct defect code in such situations (61 21 00 49 or 61 21 00 01).
- Use of BMW Group Mobile Service and battery replacement on site to restore customer mobility as quickly as possible.

2. Measure closed-circuit current

Standby current check of the 12 V battery



BMW diagnosis system (functional description):

- E38, E39, E46, E53, E83, E85,

Path: Complete vehicle > Electric motor > Voltage and current control > Voltage and current supply > Standby current measurement

- E65, E66, E67,

Path: Complete vehicle > Body > Voltage supply > Voltage and current supply > Standby current measurement > Off-load current diagnosis

- E60, E61, E63, E64, E70, E71, E72, E81, E82, E84, E87, E88, E89, E90, E91, E92, E93,
- All F Series from F01,
- BMW i
- All MINIs from R55,
- RR04,

Path: Service functions > Body > Voltage supply > Standby current

3. Check alternator

Diagnosis system (functional description):

- All except E65, E66, E67,

Path: Complete vehicle > Electric motor > Voltage and current control > Voltage and current generation

- E65, E66, E67,

Path: Complete vehicle > Body > Voltage supply > Alternator

4. Battery replacement

In the following vehicles the new battery needs to be registered via the diagnosis system:

Always:

- E65, E66, E67,
- F80, F82, F83,

Providing an intelligent battery sensor (IBS) is fitted (depends on vehicle equipment):

- E60, E61, E63, E64, E70, E71, E72, E81, E82, E84, E87, E88, E89, E90, E91, E92, E93,
- All F Series from F01,
- BMW i
- All MINIs from R55,
- RR04,

Important!

If the new battery is not registered, incorrect readings may appear in the display of the on-board computer due to previous data in the power management system (check control message "Recharge battery" appears even though the battery is new).

Only AGM batteries should be installed in the following vehicles:

- E65, E66, E67,



- F01, F02, F03, F04, F06, F07, F10, F11, F12, F13, F18,
- BMW i
- Vehicles with auxiliary heater (SA536), intelligent generator control or automatic engine start-stop function.

Only lithium ion batteries should be installed in the following vehicles:

- F80, F82, F83

5. Battery charging

5.1 Charging the lead-acid-battery or the AGM battery

- The battery may only be recharged by means of chargers that have been approved by BMW and that have a constant charging voltage of **14.8 V**.
- If possible, the battery temperature should be between 15 °C and 25 °C during charging. Under these preconditions, the battery is adequately charged when the charge current drops below 2.5 amps.
- If the battery is recharged at lower temperatures, the process should not be ended until the charge current drops below 1.5 amps.
- On vehicles with IBS, recharging the battery directly at the battery terminals could lead to a misinterpretation of the battery condition and even unwanted Check Control messages or fault entries.
- If the battery is recharged while it is installed, it must be recharged using the jump start terminal points, whenever jump start terminal points are provided in the engine compartment. Only then can you be sure that recharging is correctly recognised by the vehicle electronics on vehicles with intelligent battery sensor (IBS).

Exception: MINI from R55: These vehicles do not have any jump start terminal points in the engine compartment.

On these vehicles, the positive terminal of the battery charger must be directly connected to the battery. On vehicles with a petrol engine, the negative terminal can be connected to the lifting eye (suspension lug) on the transmission and on vehicles with diesel engines to a flange on the engine bearing block on the engine.

5.2 Charging the lithium ion battery

Important!

The charging voltage that is generated by existing chargers that are designed for the lead-acid or AGM battery is too high for the lithium ion battery.

This excessive charging voltage may **in some cases** result in that **the separating switch** of the lithium ion battery **will be opened. This does not damage the lithium ion battery.** The separator switch will close again when a charging voltage of < 14 V is applied at the battery terminals.

Before charging a lithium ion battery, adjust the charging voltage of existing charger adapters once.

- The battery may only be recharged by means of chargers that have been approved by BMW and that have a constant charging voltage of **14.0 V**.
- If possible, the battery temperature should be between 15 °C and 25 °C during charging. Under these preconditions, the battery is adequately charged when the charge current drops below 2.5 amps.
- Do not charge lithium ion battery when temperature is below 5 °C!
- The lithium ion battery can be charged via **the jump start terminal points** in the engine compartment **as well as directly on the battery terminals**.

6. Charging the high-voltage battery

Charge high-voltage battery

E72, F04

Notes on charging the high-voltage battery on standing vehicles (new and used cars)

E72, F04



Notes on charging the high-voltage battery on standing vehicles
(new and used cars)

F01H, F02H, F10H, F30H

7. Notes on handling the high-voltage battery in the workshop

F01H, F02H, F10H, F30H

Eighth Additional publications of the subject of "Batteries"

AGM battery - brief component description

Notes on AGM battery

Information on intelligent battery sensor (IBS)

Notes on lithium ion battery

Notes on battery electronics (lithium ion battery)

Battery recharging intervals for stationary vehicles, battery charging
calendar and battery tag

12-V battery, high-voltage
battery unit

Battery log form (not for USA)

{Battery Log Form} (for USA only)

Notes on charging batteriesE65

Electronic battery master switch - all model series

Battery positive terminal with battery in luggage compartment, E36

System battery discharges, E38/3

Replace system battery, E38 M73

Checking electrical connection for secondary air pump, Z3



Battery recharging intervals for booth vehicles, battery charging calendars and battery tags (12-V battery, high-voltage battery unit)

All models

Situation: Due to the self-discharging of the vehicle battery (12 V battery, high-voltage battery unit) and vehicle standby current (if the vehicle battery was not disconnected from the vehicle electrical system), the vehicle battery is discharged slowly, but continuously.

If the vehicle battery is not recharged for an extended period of time, it will be damaged. This will result in a premature battery failure.

Measure: To maintain the quality of the vehicle battery in standing vehicles, it is necessary to recharge this vehicle battery regularly.

Procedure: Recharging intervals:
12V battery

All vehicles:

- 12-V battery connected to the vehicle electrical system: **6 weeks**

All vehicles without BMW i and Plug-in Hybrid (PHEV):

- Continuous disconnection of the 12-V battery from the vehicle electrical system by removal of the ground cable to the 12 V battery or by switching off of the fitted battery master switch, if installed:
12 weeks

High-voltage battery units:

- All vehicles: **6 weeks**
- Plug-in-hybrid (PHEV): as required

The recharging intervals follow the battery charging calendar.

Recharge when the colour of the calendar week on the battery calendar matches the colour of the battery tag. Battery tags are located on all new vehicles' interior mirror.

N.B.:

1. Since different systems are used by distribution channels for documentation, it is not always clear whether the vehicle battery was actually recharged during the week that is indicated. Therefore all recharge procedures must also be documented on the battery tag on the interior mirror (write date of recharge with a smudge-proof pen and confirm that the work has been carried out with your signature next to the date). The battery tag remains in the vehicle until the vehicle is handed over to the customer and is then filed with the vehicle records.
2. Dealers who store the vehicles externally (e.g. at freight forwarding businesses) are responsible for making sure that the vehicle batteries for these vehicles are recharged according to the battery charging calendar.
3. For vehicles in show rooms, the battery tags must be placed in the glove box. In the case of an increased draw on the charge (e.g. when doors are opened, the radio is turned on, electrical seat adjustment is operated), much shorter recharging intervals are required on these vehicles (e.g. every night) so that a total battery discharge is reliably avoided. It is however better to provide for charge compensation by means of a permanent support charge in the showroom.

"Trickle charger" SI 02 03 05 (205)

Parts:
Battery log form (not just for USA)
{Battery Log Form} (for USA only)



<u>Designation</u>	<u>Part number</u>	<u>Quantity</u>
<u>Battery tag, coloured</u>		
whisky	01 89 9 781 424	as needed
sun yellow	01 89 9 781 425	as needed
emerald	01 89 9 781 426	as needed
california blue	01 89 9 781 427	as needed
brick red	01 89 9 781 428	as needed
Grey	01 89 9 781 429	as needed



Musty odour from heating and air conditioning system, evaporator cleaning

All model series

Complaint: When operating the heating and air conditioning system, a musty odour briefly occurs in the vehicle. This occurs mostly immediately after starting the engine with the air conditioning switched on or after switching off the air conditioning while driving.

Cause: The cause for the customer complaint is not a fault in the air conditioning of the vehicle. The formation of odour is due to environmental factor during the operating period of the heating and air conditioning system.

The constant condensation of air humidity at the evaporator over a long operating period of the heating and air conditioning system creates a favourable environment for bacteria and other micro-organisms.

Together with dirt contamination brought in by the fresh air, this may cause microbiological growth on the evaporator and consequently a musty odour.

Regularly changing the microfilter may reduce the entry of dirt contamination and therefore delay or prevent the development of aforementioned customer complaint.

Replacement of the evaporator has no continuous effect as microbiological organisms may redevelop.

Invoicing as warranty is not justifiable as there is no technical fault.

Vehicles concerned: All series with air conditioning (IHKR) or automatic air conditioning (IHKA).

Procedure: 1. Evaporator cleaning with spray lance

The most efficient and lasting method of eliminating the musty odour from the air conditioning is to clean the evaporator with the aid of a spray lance. With this procedure, the disinfectant is sprayed with high pressure directly on the evaporator.

Description of the operations:

For the detailed description of the procedure for the following series, please see the respective repair instructions:

- E39/E53 with air conditioning (IHKR): Cleaning evaporator
- E39/E53 with automatic air conditioning (IHKA): clean evaporator (automatic air conditioning)
- E46 with air conditioning (IHKR): Cleaning evaporator
- E46 with automatic air conditioning (IHKA): clean evaporator (automatic air conditioning)
- E65/E66: Cleaning evaporator
- E60/E61/E63/E64: Cleaning evaporator
- E85/E86: Cleaning evaporator
- E81/E82/E87/E88/E90/E91/E92/E93: Cleaning evaporator
- E70/E71/E72: Cleaning evaporator
- F01/F02/F03/F04/F06/F07/F10/F11/F12/F13/F18: Cleaning evaporator
- F20/F21/F22/F23/F30/F31/F32/F33/F34/F35/F36/F80/F82/F83/F87: Cleaning evaporator
- I01t: Cleaning evaporator
- F45/F46/F48/F49: Cleaning evaporator
- F54/F55/F56/F57/F60: Cleaning evaporator
- G05/G06/G07/G11/G12/G14/G15/G16/G30/G31/G32/G38/F90/F91/F92/F93/F95/F96: Cleaning evaporator
- G01/G02/G08/G29: Cleaning evaporator

2. Cleaning with the evaporator cleaning device "Aircomatic"

As an alternative, the evaporator can be cleaned using the "Aircomatic" cleaning system made by WYNN'S. For this purpose, use the "Airco-Clean" cleaning agent made by the same company.

WYNN'S describes this procedure as "Ultrasound procedure".



The cleaning power using the "ultrasound procedure" is lower as compared to cleaning with a spray lance.

If the "ultrasound procedure" does not bring long-term success due to very severe dirt contamination of the evaporator, clean the evaporator using a spray lance and the heating and air conditioning system cleaning agent.

Note:

This procedure is to be used for vehicles for which no spray lance is offered.

Description of the operations:

- Remove microfilter (replace with new filter after cleaning)
 - Start the vehicle
 - Switch on air conditioning
 - Set temperature control to lowest value
 - For automatic air conditioning (IHKA): Switch off automatic air distribution/supply
 - Select the lowest fan speed
 - Set ventilation to upper body area
 - Adjust air supply to air recirculation function
 - Shake the "Airco-Clean" bottle well
 - Place the ultrasound device upside down
 - Screw in the "Airco-Clean" bottle with its opening facing upwards into the device
 - Return ultrasound device to initial position allowing the contents of the bottle to partially flow into the device
 - Place the ultrasound device in the footwell on the passenger's side
 - Connect the atomisation hose to the device
 - Place the atomisation hose so that the recirculated air system can take in the emitted vapour well
- Do not kink the hose!
- Connect the ultrasound device using the included cable
- Atomisation starts!
- Close vehicle doors and side windows

Attention:

No one must remain in the vehicle during treatment!

- Treatment is complete after approx. 20 minutes and the ultrasound device stops
- After treatment, open doors and air the vehicle for approx. 5 minutes
- After treatment pour out the residual liquid in the ultrasound device
- Briefly rinse the ultrasound device with water

Parts required: 1. Cleaning with spray lance

<u>Spray lance</u>	<u>Order/part number</u>	<u>Quantity</u>
-E39/E46/E53/E83	64 1 450	1
- E65/E66/E67 (left-hand drive vehicle)	64 1 280	1
- E65/E66/E67 (right-hand drive vehicle)	64 1 290	1
-E60/E61/E63/E64	64 1 480	1
- E85/E86 (left-hand drive vehicle)	64 1 490	1
- E85/E86 (right-hand drive vehicle)	64 1 250	1
- E81/E82/E87/E88/E90/E91/E92/E93 (left-hand drive vehicle)	64 1 260	1



- E81/E82/E87/E88/E90/E91/E92/E93 (right-hand drive vehicle)	64 1 270	1
- E70/E71/E72 (left- and right-hand drive vehicle)	64 1 300	1
- F01/F02/F03/F04/F06/F07/F10/F11/F12/F13/F18 (left-hand drive vehicle)	83 30 2 222 502	1
G01/G02/G08/G29 (left-hand drive vehicle)		
- F01/F02/F03/F04/F06/F07/F10/F11/F12/F13/F18 (right-hand drive vehicle)	83 30 2 364 733	1
G01/G02/G08/G29 (right-hand drive vehicle)		
-F20/F21/F22/F23/F30/F31/F32/F33/F34/F35/F36/F80/F82/F83/F87 (left hand drive vehicle)	83 30 2 344 001	1
-F20/F21/F22/F23/F30/F31/F32/F33/F34/F35/F36/F80/F82/F83/F87 (right- hand drive vehicle)	83 30 2 289 613	1
-I01	83 30 2 413 653	1
-F45/F46/F48/F49	83 30 2 413 653	1
-F54/F55/F56/F57/F60	83 30 2 413 653	1
-G05/G06/G07/G11/G12/G30/G31/G32/G38/F90 (left-hand drive vehicle)	83 30 2 411 757	1
-G05/G06/G07/G11/G12/G30/G31/G32/G38/F90 (right-hand drive vehicle)	83 30 2 414 999	1

Spray gun

SATA spray pistol	81 45 9 429 217	1
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Heating and air conditioning system cleaning agent

Heating and air conditioning system cleaning agent (<u>only for cleaning with spray lance!</u>)	83 19 2 180 507	1
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Heating and air conditioning system cleaning agent is used undiluted. No rinsing required.

The spray lance spray gun can be obtained from the special tools online catalogue; the heating and air conditioning system cleaning agent can be obtained directly from BMW Group Parts.

2. Cleaning with the evaporator cleaning device "Aircomatic"

(Valid for all series)

<u>Description</u>	<u>Part number</u>	<u>Quantity</u>
Heating and air conditioning system cleaning agent	83 19 2 409 611	1

Heating and air conditioning system cleaning agent is used undiluted.

The "Aircomatic" cleaning device and the "Airco-Clean" cleaning agent can be obtained directly from BMW Group Parts.



Deactivating and reactivating airbags/acoustic seat belt reminder

All Series from model year 1994

Situation: If expressly desired by the customer and at the customer's responsibility, the following airbags can be deactivated and reactivated depending on the vehicle type:

- Driver's and front passenger airbag
- Front left and/or front right side airbags
- Rear left and/or rear right side airbags
- Front left and/or front right head airbags
- Rear left and/or rear right head airbags

Important note when travelling with children:

Children younger than 12 years of age or smaller than 150 cm may only travel if they are secured in suitable child restraint systems. Child restraint systems may only be used on the front passenger seat when the airbag is deactivated, as otherwise there is a substantial risk of injury to the children if the airbag is deployed, even if they are seated in a child restraint system. If it cannot be prevented that children lean out of their seat in the direction of the door trim panel, the side airbag in the rear should be deactivated. Otherwise, there is a risk of considerable injury if the side airbag deploys.

Vehicles concerned: The following exceptions relating to the deactivation or reactivation of the airbag must be observed.

- E64 Production period: from series introduction until August 2005)

The different seat/seat belt system (SGS) means that the legal standard ECE-R21 "new" cannot be met. For technical reasons, the E64 cannot be approved in accordance with ECE-R21 "old", as in the case of the E46 Convertible. For this reason, it is not permissible to deactivate the front passenger airbag by means of conversion (encoding).

- E83 Production period: from September 2004

A modification to the front passenger airbag cover means that the front passenger airbag is no longer to be deactivated by conversion (encoding). For these vehicles, a key switch is available optionally and as a retrofit kit.

- R50/52/53 Vehicles with "JOHN COOPER WORKS sports seats":

The decisive document for installation is the installation instructions for "Retrofitting John Cooper Works sports seats". The vehicle's operating licence is **not** invalidated if "John Cooper Works sports seats" are retrofitted. The "JOHN COOPER WORKS sport seat" is an element of the European operating licence of the MINI (R50/R53). Approval of the installation by a technical control organization and entry into the vehicle documents is **not** required.

Thus, the following documentation in the appendices of the service information is not required when installing the "JOHN COOPER WORKS sport seats":

- Procedure for deactivation or reactivation of the airbags in the dealer organisation; Section "Documentation of the conversion" (Appendix 1)
- Documentation of the customer agreement and the performed work (Appendix 3)
- All BMW F-series, BMW i and MINI from R58:

In these vehicles, deactivation/activation of the airbags is only possible using a factory-installed key switch.

The key switch cannot be retrofitted!

It is not possible to deactivate/activate the airbags by means of conversion.

Procedure: Deactivating / reactivating airbags

Attention!

For vehicles with belt force limiter without key switch, the seat belt must be exchanged for a "seat belt **without** belt force limiter" when the front passenger airbag is deactivated.



It is not necessary to replace the seat belt in the E46/C.

If the front passenger airbag is reactivated, the seat belt must again be replaced with a "seat belt **with** belt force limiter" when the front passenger airbag is reactivated.

In **Australia and Korea** it is not permitted to deactivate the front passenger airbag.

For vehicles for which a **key switch** is available for deactivating/reactivating the airbags is optionally available, retrofit kits are also available for retrofitting a key switch (exception: all BMW F-series, BMW i, MINI from R58)

Tables 1 and 2 provide an overview of the measures needed for deactivating/reactivating the airbags and the acoustic seat belt warning, taking the stipulations for the specific models into account.

Attention!

The combination of certain equipment specifications, national-market versions and country-specific regulations may result in deviations to the data presented in Tables 1 and 2. If in doubt, contact Technical Support before carrying out any work.

Key:

- 1 - Deactivation occurs through a conversion with the diagnosis system.
- 2 - Deactivation takes place via a factory-installed or retrofitted key switch.
- 3 - Deactivation takes place via a factory-installed key switch, which cannot be retrofitted.

Table 1: Airbag deactivation/reactivation

Model series	Date of introduction	Front airbag		Side airbag		Head airbag		Remarks
		Driver	Passenger	Front	Rear	Front	Rear	
E34	From 09.93	1	1	1				Please refer to Enclosure 5.
E36	From 09.93	1	1	1				Please refer to Enclosure 6.
E36/Z3	from series production	1	1	1				
E38	from series production	1	1	1	1	1	1	
E39	from series production	1	1	1	1	1	1	
E46	from series production	1	1	1	1	1		
E52	from series production	1	1	1				
E53	from series production	1	1	1	1	1	1	
E60/E61	up to 08.05		1	1	1			
E60/E61	From 09.05		2	2	1			
E63	up to 08.05		1	1	1			
E63	From 09.05		2	2	1			
E64	up to 08.05			1	1			
E64	From 09.05		2	2	1			
E65/E66	from series production		1	1	1			



E70/71/72	from series production		2	2				
E81/82/88	from series production		2	2				
E83	up to 08.04		1	1	1			
E83	From 09.04		2	2	1			
E84	from series production		2	2				
E85/86	from series production		2	2				
E87	From 03.05		2	2				
E89	from series production		2	2				
E90/91/92/93	from series production		2	2				
R50/R53	up to 06.04		1	1		1		
R50/53	From 07.04		2	2		1		
R52	from series production		2	2				
R55/56/57	from series production		2	2				
MINI from R58	from series production		3	3				
BMW F-Series	from series production		3	3				
BMW i	from series production		3	3				

Deactivation/reactivation of acoustic seat belt warning

Deactivate and reactivate the acoustic seat belt warning for the driver and front passenger by conversion as per the table below.

Note:

Deactivating the acoustic seat belt warning is not permitted in Japan.

With the E53, the deactivation / reactivation of the acoustic seat belt warning on the front passenger side is only possible with the installation of a Light Check Module (LCM) / light module (LM) with a coding index 24 or higher (series from April 2005).

Deactivating the acoustic seat belt warning in R50/52/53 is not possible.

Table 2: Deactivating/reactivating the acoustic seat belt warning

<u>Model series</u>	<u>Driver and front passenger</u>	<u>Front passenger only</u>	<u>Remarks</u>
E53		1	
E70/71/72	1		only in conjunction with option 230
E60/61/63/64	1		
E65/66	1		
E81/82/87/88	1		



E83	1		
E84	1		
E85/86	1		
E89	1		
E90/91/92/93	1		
MINI from R55	1		
BMW F-Series	1		
BMW i	1		

Location of documents for deactivating or reactivating the airbag

- Procedure for deactivating and reactivating airbags in the dealer organisation: Please refer to Enclosure 1 .
- For how to encode the airbag control unit: Please refer to Enclosure 2 .
- For notes on documenting the customer's consent and the work carried out: Please refer to Enclosure 3 .
- Identification of airbag systems Please refer to Enclosure 4 .
- Deactivating or reactivating the airbags in E34 series vehicles Please refer to Enclosure 5 .
- Deactivating or reactivating the airbags in E36 series vehicles (excluding Z3) Please refer to Enclosure 6 .
- Deactivating or reactivating the acoustic seat belt warning Please refer to Enclosure 7

Note:

Only the airbags listed in the table can be deactivated.

- Deactivating or reactivating the airbags in series E36/Z3,38,39,46,52,53,60,61,63,65,66,83 (to August 2004), R50,53 (to July 2004) See repair instructions RAGRP72-7212DEAKTIV-OHNE
- Deactivating or reactivating the front passenger airbag using a key switch in series E60,61,63,64 (from September 2005) E83 (from September 2004), E87 (from March 2005) E85,70,90,91,92,93,R50,53 (from July 2004), R52 See repair instructions RAGRP72-7212DEAKTIV-WITH

Parts:

<u>Designation</u>	<u>Part number</u>	<u>Quantity</u>
Upper front seat belt without belt force limiter	See Electronic Parts Catalogue (EPC)	1
Sets of forms/parts, multilingual (with warning stickers)	01 39 0 028 759	1



CD changer: Malfunction

All models with CD changer

Situation: Despite intensive supplier checks, no malfunction can be found with a large number of CD changers returned under warranty.

These CD changers are often returned without the CD magazine and in an unsuitable transport condition while bearing the label "Failed". This generally results in the CD changer being classified as kFg (no fault found) and returned to the dealer. The warranty claim is rejected.

Important notes for CD changers in the vehicle:

- As opposed to CD changers in the home, mobile CD changers are subjected to an extremely wide range of different influences.

The mechanics must be spring-mounted, which (depending on the manufacturer) is provided by a rubber damper with an air reservoir or an oil damper. For this reason the transportation retainers must always be removed before installing the CD changer.

- The CD changer can hold and properly position 12 cm standard CDs. Please note that the CDs must not be too thick as well as deburred around the central hole or outer edge.
- Transparent CDs and CDs with asymmetrical dimensions can no longer be reliably detected and positioned by the laser beams in the CD changer. Asymmetric CDs cause the CD magazine to jam in the CD changer. The magazine can no longer be removed from the changer.
- Ensure the spring suspension is set correctly for replacement units. Depending on the installation position, set the "installation position" on the CD changer to horizontal or vertical. On the E36 Compact, set the "installation position" on the CD changer to 45°.
- The magazine compartment must be closed at all times to prevent dust and other contaminants from entering the CD changer and impairing the system function.
- Ensure all CDs are clean to avoid soiling the laser and impairing the CD changer function.
- No guarantee is given that CDs burned at home will be played. The quality of the audio playback depends on the quality of the blank CD, the CD burner and parameters selected when burning the CD.
- The CD changer is not suitable for rewritable CDs (called CD-RWs).

Affected vehicles: All BMW models with CD changer (optional equipment 672)

Procedure: In the event of a customer complaint, always diagnose the exact cause of the failure before replacing the CD changer.

As the fault cause may be a faulty CD magazine or caused by faulty CDs/homemade CDs, always test the system with a new CD magazine and different CDs to see if the customer complaint is reproduced.

Note for obligatory return markets:

For the warranty parts inspection, it is absolutely mandatory that the CD changer is always returned together with the customer's original CD magazine and the device connecting lines. The CD changer must be fitted with transportation retainers when returned: A CD changer without any form of transportation retainer may be damaged during transport.

Please return the CD changer in the original packaging of the replacement CD changer.

CD changers without a CD magazine and transportation retainer will be returned immediately by the Warranty Parts Centre (GWTZ) and the warranty application will be rejected.

Furthermore, ensure that each CD changer or CD magazine returned is accompanied by the blue complaint and repair documentation completed in full (part number: 01 30 9 789 549). The number of CDs in the changer must also be recorded in the repair documentation.



Deactivating and reactivating airbags/acoustic seat belt reminder

All Series from model year 1994

Situation: If expressly desired by the customer and at the customer's responsibility, the following airbags can be deactivated and reactivated depending on the vehicle type:

- Driver's and front passenger airbag
- Front left and/or front right side airbags
- Rear left and/or rear right side airbags
- Front left and/or front right head airbags
- Rear left and/or rear right head airbags

Important note when travelling with children:

Children younger than 12 years of age or smaller than 150 cm may only travel if they are secured in suitable child restraint systems. Child restraint systems may only be used on the front passenger seat when the airbag is deactivated, as otherwise there is a substantial risk of injury to the children if the airbag is deployed, even if they are seated in a child restraint system. If it cannot be prevented that children lean out of their seat in the direction of the door trim panel, the side airbag in the rear should be deactivated. Otherwise, there is a risk of considerable injury if the side airbag deploys.

Vehicles concerned: The following exceptions relating to the deactivation or reactivation of the airbag must be observed.

- E64 Production period: from series introduction until August 2005)

The different seat/seat belt system (SGS) means that the legal standard ECE-R21 "new" cannot be met. For technical reasons, the E64 cannot be approved in accordance with ECE-R21 "old", as in the case of the E46 Convertible. For this reason, it is not permissible to deactivate the front passenger airbag by means of conversion (encoding).

- E83 Production period: from September 2004

A modification to the front passenger airbag cover means that the front passenger airbag is no longer to be deactivated by conversion (encoding). For these vehicles, a key switch is available optionally and as a retrofit kit.

- R50/52/53 Vehicles with "JOHN COOPER WORKS sports seats":

The decisive document for installation is the installation instructions for "Retrofitting John Cooper Works sports seats". The vehicle's operating licence is **not** invalidated if "John Cooper Works sports seats" are retrofitted. The "JOHN COOPER WORKS sport seat" is an element of the European operating licence of the MINI (R50/R53). Approval of the installation by a technical control organization and entry into the vehicle documents is **not** required.

Thus, the following documentation in the appendices of the service information is not required when installing the "JOHN COOPER WORKS sport seats":

- Procedure for deactivation or reactivation of the airbags in the dealer organisation; Section "Documentation of the conversion" (Appendix 1)
- Documentation of the customer agreement and the performed work (Appendix 3)
- All BMW F-series, BMW i and MINI from R58:

In these vehicles, deactivation/activation of the airbags is only possible using a factory-installed key switch.

The key switch cannot be retrofitted!

It is not possible to deactivate/activate the airbags by means of conversion.

Procedure: Deactivating / reactivating airbags

Attention!

For vehicles with belt force limiter without key switch, the seat belt must be exchanged for a "seat belt **without** belt force limiter" when the front passenger airbag is deactivated.



It is not necessary to replace the seat belt in the E46/C.

If the front passenger airbag is reactivated, the seat belt must again be replaced with a "seat belt **with** belt force limiter" when the front passenger airbag is reactivated.

In **Australia and Korea** it is not permitted to deactivate the front passenger airbag.

For vehicles for which a **key switch** is available for deactivating/reactivating the airbags is optionally available, retrofit kits are also available for retrofitting a key switch (exception: all BMW F-series, BMW i, MINI from R58)

Tables 1 and 2 provide an overview of the measures needed for deactivating/reactivating the airbags and the acoustic seat belt warning, taking the stipulations for the specific models into account.

Attention!

The combination of certain equipment specifications, national-market versions and country-specific regulations may result in deviations to the data presented in Tables 1 and 2. If in doubt, contact Technical Support before carrying out any work.

Key:

- 1 - Deactivation occurs through a conversion with the diagnosis system.
- 2 - Deactivation takes place via a factory-installed or retrofitted key switch.
- 3 - Deactivation takes place via a factory-installed key switch, which cannot be retrofitted.

Table 1: Airbag deactivation/reactivation

Model series	Date of introduction	Front airbag		Side airbag		Head airbag		Remarks
		Driver	Passenger	Front	Rear	Front	Rear	
E34	From 09.93	1	1	1				Please refer to Enclosure 5.
E36	From 09.93	1	1	1				Please refer to Enclosure 6.
E36/Z3	from series production	1	1	1				
E38	from series production	1	1	1	1	1	1	
E39	from series production	1	1	1	1	1	1	
E46	from series production	1	1	1	1	1		
E52	from series production	1	1	1				
E53	from series production	1	1	1	1	1	1	
E60/E61	up to 08.05		1	1	1			
E60/E61	From 09.05		2	2	1			
E63	up to 08.05		1	1	1			
E63	From 09.05		2	2	1			
E64	up to 08.05			1	1			
E64	From 09.05		2	2	1			
E65/E66	from series production		1	1	1			



E70/71/72	from series production		2	2				
E81/82/88	from series production		2	2				
E83	up to 08.04		1	1	1			
E83	From 09.04		2	2	1			
E84	from series production		2	2				
E85/86	from series production		2	2				
E87	From 03.05		2	2				
E89	from series production		2	2				
E90/91/92/93	from series production		2	2				
R50/R53	up to 06.04		1	1		1		
R50/53	From 07.04		2	2		1		
R52	from series production		2	2				
R55/56/57	from series production		2	2				
MINI from R58	from series production		3	3				
BMW F-Series	from series production		3	3				
BMW i	from series production		3	3				

Deactivation/reactivation of acoustic seat belt warning

Deactivate and reactivate the acoustic seat belt warning for the driver and front passenger by conversion as per the table below.

Note:

Deactivating the acoustic seat belt warning is not permitted in Japan.

With the E53, the deactivation / reactivation of the acoustic seat belt warning on the front passenger side is only possible with the installation of a Light Check Module (LCM) / light module (LM) with a coding index 24 or higher (series from April 2005).

Deactivating the acoustic seat belt warning in R50/52/53 is not possible.

Table 2: Deactivating/reactivating the acoustic seat belt warning

<u>Model series</u>	<u>Driver and front passenger</u>	<u>Front passenger only</u>	<u>Remarks</u>
E53		1	
E70/71/72	1		only in conjunction with option 230
E60/61/63/64	1		
E65/66	1		
E81/82/87/88	1		



E83	1		
E84	1		
E85/86	1		
E89	1		
E90/91/92/93	1		
MINI from R55	1		
BMW F-Series	1		
BMW i	1		

Location of documents for deactivating or reactivating the airbag

- Procedure for deactivating and reactivating airbags in the dealer organisation: Please refer to Enclosure 1 .
- For how to encode the airbag control unit: Please refer to Enclosure 2 .
- For notes on documenting the customer's consent and the work carried out: Please refer to Enclosure 3 .
- Identification of airbag systems Please refer to Enclosure 4 .
- Deactivating or reactivating the airbags in E34 series vehicles Please refer to Enclosure 5 .
- Deactivating or reactivating the airbags in E36 series vehicles (excluding Z3) Please refer to Enclosure 6 .
- Deactivating or reactivating the acoustic seat belt warning Please refer to Enclosure 7

Note:

Only the airbags listed in the table can be deactivated.

- Deactivating or reactivating the airbags in series E36/Z3,38,39,46,52,53,60,61,63,65,66,83 (to August 2004), R50,53 (to July 2004) See repair instructions RAGRP72-7212DEAKTIV-OHNE
- Deactivating or reactivating the front passenger airbag using a key switch in series E60,61,63,64 (from September 2005) E83 (from September 2004), E87 (from March 2005) E85,70,90,91,92,93,R50,53 (from July 2004), R52 See repair instructions RAGRP72-7212DEAKTIV-WITH

Parts:

<u>Designation</u>	<u>Part number</u>	<u>Quantity</u>
Upper front seat belt without belt force limiter	See Electronic Parts Catalogue (EPC)	1
Sets of forms/parts, multilingual (with warning stickers)	01 39 0 028 759	1



Master document for airbag/belt tensioner

All model series

Situation: The volume of information about the airbag/belt tensioner topic has greatly increased in the past few years due to technical innovations. To simplify the targeted search for information, this document contains a summary of all important information about the handling of airbags/belt tensioners at the dealer's operation and can be accessed directly using hotspot.

Procedure: Search for a topic in the table below and select a document with hotspot.

1. Fault memory / airbag indicator light

"Airbag with seat occupancy detection"	SI 65 04 96 (064)
Side airbag: Troubleshooting 05/06 (MRS3) or fault code 08/09 (MRS)"	SI 65 03 00 (573)
"Airbag fault code 01/0D (MRS3): Driver's airbag"	SI 65 07 00 (603)

2. Repair

"Repair of airbag systems that have been activated"	SI 65 09 89 (126)
"Airbag, repair instructions for ignition circuits"	SI 61 01 99 (397)
"Airbag: Repair instructions for the ignition circuit, belt tensioner and/or side airbag"	SI 61 01 03 (952)
"Airbag control unit replacement"	SI 65 10 96 (129)

3. Deactivation / recoding

"Deactivated side airbags in the rear passenger compartment"	SI 65 07 99 (442)
"Recode the airbag control unit"	SI 65 37 01 (000)
"Check side airbag impact sensors and recode the airbag control unit"	SI 65 39 01 (000)
"Recode the airbag control unit"	SI 65 40 01 (000)
"Deactivation or reactivation of airbags / belt warning sound"	SI 65 13 00 (641)



New audio test CD for complaints about sound system playback

All series

Situation: In case of customer complaints about sound quality when playing CDs or DVDs, it can be extremely difficult to diagnose whether it is a problem with the drive or a problem with the disc itself.

This is in part because customers are increasingly using discs of poorer quality (e.g. self-recorded CDs), which either cannot be played or can only be played poorly.

To help you distinguish, an audio test CD is now available.

This audio test CD should be used to analyse the following complaints on the customer's vehicle:

- CD/DVD not accepted
- CD/DVD jumps
- CD/DVD cannot be read
- CD/DVD operation interrupted permanently or intermittently

Note:

The audio test CD contains a track with built-in faults, but which the sound system should play back correctly.

Affected vehicles: All model series with original BMW/MINI audio systems with CD/DVD drive or CD/DVD changer.

Procedure: Insert the audio test CD in the drive for which the customer has complained about the sound quality.

Important:

The audio test CD provides a sensitive reference.

For this reason, comply with the following guidelines:

- Do not touch the CD on the playing surface, only on the edge.
- Do not stick labels or write on the CD's surface.
- Do not expose the CD to direct sunlight or high temperatures.
- Only remove the CD from its protective cover for immediate use.

Play track 12 of the audio test CD and then perform the following fault analysis:

- If no faults can be detected in the sound quality, there is no fault in the audio system. Replacing parts will therefore not achieve the desired result and must not be performed.
- Check whether the disc used by the customer is the cause of the complaint.
- If there is interference or if the CD jumps when track 12 is being played, the audio system / drive must be replaced.

Note:

The new audio test CD 01 99 00 33 475 does not supersede audio test CD 01 59 0 004 055 (please refer to SI 65 03 98 381).

The other tracks on audio test CD 01 99 00 33 475 are of no relevance to the analysis and can be ignored.



66 01 07 (394)

Notes on radio-operated system (vehicle access, radio-operated opening, radio-operated closing)

All

Situation: With some functional procedures and unintended activations, use of the radio-operated systems for vehicle access, radio-operated opening and radio-operated closing leads to faulty interpretations and thus to complaints.

Procedure: The known complaint cases are described in the following appendices. Each case is presented with its causes and any necessary measures.

Enclosure 1: Self-locker

Enclosure 2: Range problem

Enclosure 3: Selective unlocking

Enclosure 4: Convenient access/convenient opening

Enclosure 5: Radio remote control failed/poor radio reception

Enclosure 6: Self-opener



00 02 06 (296)

Drawbar load sign omitted

All with options 235 and 3AC

Situation:

There have been new vehicle documents since 2005-10-01.

Beginning with this production date, vehicles no longer need to be equipped with the trailer hitch drawbar load sign.

Corresponding information on the options is provided in the vehicle documents.

The regulation pertains to all series.



Deactivating and reactivating airbags/acoustic seat belt reminder

All Series from model year 1994

Situation: If expressly desired by the customer and at the customer's responsibility, the following airbags can be deactivated and reactivated depending on the vehicle type:

- Driver's and front passenger airbag
- Front left and/or front right side airbags
- Rear left and/or rear right side airbags
- Front left and/or front right head airbags
- Rear left and/or rear right head airbags

Important note when travelling with children:

Children younger than 12 years of age or smaller than 150 cm may only travel if they are secured in suitable child restraint systems. Child restraint systems may only be used on the front passenger seat when the airbag is deactivated, as otherwise there is a substantial risk of injury to the children if the airbag is deployed, even if they are seated in a child restraint system. If it cannot be prevented that children lean out of their seat in the direction of the door trim panel, the side airbag in the rear should be deactivated. Otherwise, there is a risk of considerable injury if the side airbag deploys.

Vehicles concerned: The following exceptions relating to the deactivation or reactivation of the airbag must be observed.

- E64 Production period: from series introduction until August 2005)

The different seat/seat belt system (SGS) means that the legal standard ECE-R21 "new" cannot be met. For technical reasons, the E64 cannot be approved in accordance with ECE-R21 "old", as in the case of the E46 Convertible. For this reason, it is not permissible to deactivate the front passenger airbag by means of conversion (encoding).

- E83 Production period: from September 2004

A modification to the front passenger airbag cover means that the front passenger airbag is no longer to be deactivated by conversion (encoding). For these vehicles, a key switch is available optionally and as a retrofit kit.

- R50/52/53 Vehicles with "JOHN COOPER WORKS sports seats":

The decisive document for installation is the installation instructions for "Retrofitting John Cooper Works sports seats". The vehicle's operating licence is **not** invalidated if "John Cooper Works sports seats" are retrofitted. The "JOHN COOPER WORKS sport seat" is an element of the European operating licence of the MINI (R50/R53). Approval of the installation by a technical control organization and entry into the vehicle documents is **not** required.

Thus, the following documentation in the appendices of the service information is not required when installing the "JOHN COOPER WORKS sport seats":

- Procedure for deactivation or reactivation of the airbags in the dealer organisation; Section "Documentation of the conversion" (Appendix 1)
- Documentation of the customer agreement and the performed work (Appendix 3)
- All BMW F-series, BMW i and MINI from R58:

In these vehicles, deactivation/activation of the airbags is only possible using a factory-installed key switch.

The key switch cannot be retrofitted!

It is not possible to deactivate/activate the airbags by means of conversion.

Procedure: Deactivating / reactivating airbags

Attention!

For vehicles with belt force limiter without key switch, the seat belt must be exchanged for a "seat belt **without** belt force limiter" when the front passenger airbag is deactivated.



It is not necessary to replace the seat belt in the E46/C.

If the front passenger airbag is reactivated, the seat belt must again be replaced with a "seat belt **with** belt force limiter" when the front passenger airbag is reactivated.

In **Australia and Korea** it is not permitted to deactivate the front passenger airbag.

For vehicles for which a **key switch** is available for deactivating/reactivating the airbags is optionally available, retrofit kits are also available for retrofitting a key switch (exception: all BMW F-series, BMW i, MINI from R58)

Tables 1 and 2 provide an overview of the measures needed for deactivating/reactivating the airbags and the acoustic seat belt warning, taking the stipulations for the specific models into account.

Attention!

The combination of certain equipment specifications, national-market versions and country-specific regulations may result in deviations to the data presented in Tables 1 and 2. If in doubt, contact Technical Support before carrying out any work.

Key:

- 1 - Deactivation occurs through a conversion with the diagnosis system.
- 2 - Deactivation takes place via a factory-installed or retrofitted key switch.
- 3 - Deactivation takes place via a factory-installed key switch, which cannot be retrofitted.

Table 1: Airbag deactivation/reactivation

Model series	Date of introduction	Front airbag		Side airbag		Head airbag		Remarks
		Driver	Passenger	Front	Rear	Front	Rear	
E34	From 09.93	1	1	1				Please refer to Enclosure 5.
E36	From 09.93	1	1	1				Please refer to Enclosure 6.
E36/Z3	from series production	1	1	1				
E38	from series production	1	1	1	1	1	1	
E39	from series production	1	1	1	1	1	1	
E46	from series production	1	1	1	1	1		
E52	from series production	1	1	1				
E53	from series production	1	1	1	1	1	1	
E60/E61	up to 08.05		1	1	1			
E60/E61	From 09.05		2	2	1			
E63	up to 08.05		1	1	1			
E63	From 09.05		2	2	1			
E64	up to 08.05			1	1			
E64	From 09.05		2	2	1			
E65/E66	from series production		1	1	1			



E70/71/72	from series production		2	2				
E81/82/88	from series production		2	2				
E83	up to 08.04		1	1	1			
E83	From 09.04		2	2	1			
E84	from series production		2	2				
E85/86	from series production		2	2				
E87	From 03.05		2	2				
E89	from series production		2	2				
E90/91/92/93	from series production		2	2				
R50/R53	up to 06.04		1	1		1		
R50/53	From 07.04		2	2		1		
R52	from series production		2	2				
R55/56/57	from series production		2	2				
MINI from R58	from series production		3	3				
BMW F-Series	from series production		3	3				
BMW i	from series production		3	3				

Deactivation/reactivation of acoustic seat belt warning

Deactivate and reactivate the acoustic seat belt warning for the driver and front passenger by conversion as per the table below.

Note:

Deactivating the acoustic seat belt warning is not permitted in Japan.

With the E53, the deactivation / reactivation of the acoustic seat belt warning on the front passenger side is only possible with the installation of a Light Check Module (LCM) / light module (LM) with a coding index 24 or higher (series from April 2005).

Deactivating the acoustic seat belt warning in R50/52/53 is not possible.

Table 2: Deactivating/reactivating the acoustic seat belt warning

<u>Model series</u>	<u>Driver and front passenger</u>	<u>Front passenger only</u>	<u>Remarks</u>
E53		1	
E70/71/72	1		only in conjunction with option 230
E60/61/63/64	1		
E65/66	1		
E81/82/87/88	1		



E83	1		
E84	1		
E85/86	1		
E89	1		
E90/91/92/93	1		
MINI from R55	1		
BMW F-Series	1		
BMW i	1		

Location of documents for deactivating or reactivating the airbag

- Procedure for deactivating and reactivating airbags in the dealer organisation: Please refer to Enclosure 1 .
- For how to encode the airbag control unit: Please refer to Enclosure 2 .
- For notes on documenting the customer's consent and the work carried out: Please refer to Enclosure 3 .
- Identification of airbag systems Please refer to Enclosure 4 .
- Deactivating or reactivating the airbags in E34 series vehicles Please refer to Enclosure 5 .
- Deactivating or reactivating the airbags in E36 series vehicles (excluding Z3) Please refer to Enclosure 6 .
- Deactivating or reactivating the acoustic seat belt warning Please refer to Enclosure 7

Note:

Only the airbags listed in the table can be deactivated.

- Deactivating or reactivating the airbags in series E36/Z3,38,39,46,52,53,60,61,63,65,66,83 (to August 2004), R50,53 (to July 2004) See repair instructions RAGRP72-7212DEAKTIV-OHNE
- Deactivating or reactivating the front passenger airbag using a key switch in series E60,61,63,64 (from September 2005) E83 (from September 2004), E87 (from March 2005) E85,70,90,91,92,93,R50,53 (from July 2004), R52 See repair instructions RAGRP72-7212DEAKTIV-WITH

Parts:

<u>Designation</u>	<u>Part number</u>	<u>Quantity</u>
Upper front seat belt without belt force limiter	See Electronic Parts Catalogue (EPC)	1
Sets of forms/parts, multilingual (with warning stickers)	01 39 0 028 759	1



Deactivating and reactivating airbags/acoustic seat belt reminder

All Series from model year 1994

Situation: If expressly desired by the customer and at the customer's responsibility, the following airbags can be deactivated and reactivated depending on the vehicle type:

- Driver's and front passenger airbag
- Front left and/or front right side airbags
- Rear left and/or rear right side airbags
- Front left and/or front right head airbags
- Rear left and/or rear right head airbags

Important note when travelling with children:

Children younger than 12 years of age or smaller than 150 cm may only travel if they are secured in suitable child restraint systems. Child restraint systems may only be used on the front passenger seat when the airbag is deactivated, as otherwise there is a substantial risk of injury to the children if the airbag is deployed, even if they are seated in a child restraint system. If it cannot be prevented that children lean out of their seat in the direction of the door trim panel, the side airbag in the rear should be deactivated. Otherwise, there is a risk of considerable injury if the side airbag deploys.

Vehicles concerned: The following exceptions relating to the deactivation or reactivation of the airbag must be observed.

- E64 Production period: from series introduction until August 2005)

The different seat/seat belt system (SGS) means that the legal standard ECE-R21 "new" cannot be met. For technical reasons, the E64 cannot be approved in accordance with ECE-R21 "old", as in the case of the E46 Convertible. For this reason, it is not permissible to deactivate the front passenger airbag by means of conversion (encoding).

- E83 Production period: from September 2004

A modification to the front passenger airbag cover means that the front passenger airbag is no longer to be deactivated by conversion (encoding). For these vehicles, a key switch is available optionally and as a retrofit kit.

- R50/52/53 Vehicles with "JOHN COOPER WORKS sports seats":

The decisive document for installation is the installation instructions for "Retrofitting John Cooper Works sports seats". The vehicle's operating licence is **not** invalidated if "John Cooper Works sports seats" are retrofitted. The "JOHN COOPER WORKS sport seat" is an element of the European operating licence of the MINI (R50/R53). Approval of the installation by a technical control organization and entry into the vehicle documents is **not** required.

Thus, the following documentation in the appendices of the service information is not required when installing the "JOHN COOPER WORKS sport seats":

- Procedure for deactivation or reactivation of the airbags in the dealer organisation; Section "Documentation of the conversion" (Appendix 1)
- Documentation of the customer agreement and the performed work (Appendix 3)
- All BMW F-series, BMW i and MINI from R58:

In these vehicles, deactivation/activation of the airbags is only possible using a factory-installed key switch.

The key switch cannot be retrofitted!

It is not possible to deactivate/activate the airbags by means of conversion.

Procedure: Deactivating / reactivating airbags

Attention!

For vehicles with belt force limiter without key switch, the seat belt must be exchanged for a "seat belt **without** belt force limiter" when the front passenger airbag is deactivated.



It is not necessary to replace the seat belt in the E46/C.

If the front passenger airbag is reactivated, the seat belt must again be replaced with a "seat belt **with** belt force limiter" when the front passenger airbag is reactivated.

In **Australia and Korea** it is not permitted to deactivate the front passenger airbag.

For vehicles for which a **key switch** is available for deactivating/reactivating the airbags is optionally available, retrofit kits are also available for retrofitting a key switch (exception: all BMW F-series, BMW i, MINI from R58)

Tables 1 and 2 provide an overview of the measures needed for deactivating/reactivating the airbags and the acoustic seat belt warning, taking the stipulations for the specific models into account.

Attention!

The combination of certain equipment specifications, national-market versions and country-specific regulations may result in deviations to the data presented in Tables 1 and 2. If in doubt, contact Technical Support before carrying out any work.

Key:

- 1 - Deactivation occurs through a conversion with the diagnosis system.
- 2 - Deactivation takes place via a factory-installed or retrofitted key switch.
- 3 - Deactivation takes place via a factory-installed key switch, which cannot be retrofitted.

Table 1: Airbag deactivation/reactivation

Model series	Date of introduction	Front airbag		Side airbag		Head airbag		Remarks
		Driver	Passenger	Front	Rear	Front	Rear	
E34	From 09.93	1	1	1				Please refer to Enclosure 5.
E36	From 09.93	1	1	1				Please refer to Enclosure 6.
E36/Z3	from series production	1	1	1				
E38	from series production	1	1	1	1	1	1	
E39	from series production	1	1	1	1	1	1	
E46	from series production	1	1	1	1	1		
E52	from series production	1	1	1				
E53	from series production	1	1	1	1	1	1	
E60/E61	up to 08.05		1	1	1			
E60/E61	From 09.05		2	2	1			
E63	up to 08.05		1	1	1			
E63	From 09.05		2	2	1			
E64	up to 08.05			1	1			
E64	From 09.05		2	2	1			
E65/E66	from series production		1	1	1			



E70/71/72	from series production		2	2				
E81/82/88	from series production		2	2				
E83	up to 08.04		1	1	1			
E83	From 09.04		2	2	1			
E84	from series production		2	2				
E85/86	from series production		2	2				
E87	From 03.05		2	2				
E89	from series production		2	2				
E90/91/92/93	from series production		2	2				
R50/R53	up to 06.04		1	1		1		
R50/53	From 07.04		2	2		1		
R52	from series production		2	2				
R55/56/57	from series production		2	2				
MINI from R58	from series production		3	3				
BMW F-Series	from series production		3	3				
BMW i	from series production		3	3				

Deactivation/reactivation of acoustic seat belt warning

Deactivate and reactivate the acoustic seat belt warning for the driver and front passenger by conversion as per the table below.

Note:

Deactivating the acoustic seat belt warning is not permitted in Japan.

With the E53, the deactivation / reactivation of the acoustic seat belt warning on the front passenger side is only possible with the installation of a Light Check Module (LCM) / light module (LM) with a coding index 24 or higher (series from April 2005).

Deactivating the acoustic seat belt warning in R50/52/53 is not possible.

Table 2: Deactivating/reactivating the acoustic seat belt warning

<u>Model series</u>	<u>Driver and front passenger</u>	<u>Front passenger only</u>	<u>Remarks</u>
E53		1	
E70/71/72	1		only in conjunction with option 230
E60/61/63/64	1		
E65/66	1		
E81/82/87/88	1		



E83	1		
E84	1		
E85/86	1		
E89	1		
E90/91/92/93	1		
MINI from R55	1		
BMW F-Series	1		
BMW i	1		

Location of documents for deactivating or reactivating the airbag

- Procedure for deactivating and reactivating airbags in the dealer organisation: Please refer to Enclosure 1 .
- For how to encode the airbag control unit: Please refer to Enclosure 2 .
- For notes on documenting the customer's consent and the work carried out: Please refer to Enclosure 3 .
- Identification of airbag systems Please refer to Enclosure 4 .
- Deactivating or reactivating the airbags in E34 series vehicles Please refer to Enclosure 5 .
- Deactivating or reactivating the airbags in E36 series vehicles (excluding Z3) Please refer to Enclosure 6 .
- Deactivating or reactivating the acoustic seat belt warning Please refer to Enclosure 7

Note:

Only the airbags listed in the table can be deactivated.

- Deactivating or reactivating the airbags in series E36/Z3,38,39,46,52,53,60,61,63,65,66,83 (to August 2004), R50,53 (to July 2004) See repair instructions RAGRP72-7212DEAKTIV-OHNE
- Deactivating or reactivating the front passenger airbag using a key switch in series E60,61,63,64 (from September 2005) E83 (from September 2004), E87 (from March 2005) E85,70,90,91,92,93,R50,53 (from July 2004), R52 See repair instructions RAGRP72-7212DEAKTIV-WITH

Parts:

<u>Designation</u>	<u>Part number</u>	<u>Quantity</u>
Upper front seat belt without belt force limiter	See Electronic Parts Catalogue (EPC)	1
Sets of forms/parts, multilingual (with warning stickers)	01 39 0 028 759	1



Deactivating and reactivating airbags/acoustic seat belt reminder

All Series from model year 1994

Situation: If expressly desired by the customer and at the customer's responsibility, the following airbags can be deactivated and reactivated depending on the vehicle type:

- Driver's and front passenger airbag
- Front left and/or front right side airbags
- Rear left and/or rear right side airbags
- Front left and/or front right head airbags
- Rear left and/or rear right head airbags

Important note when travelling with children:

Children younger than 12 years of age or smaller than 150 cm may only travel if they are secured in suitable child restraint systems. Child restraint systems may only be used on the front passenger seat when the airbag is deactivated, as otherwise there is a substantial risk of injury to the children if the airbag is deployed, even if they are seated in a child restraint system. If it cannot be prevented that children lean out of their seat in the direction of the door trim panel, the side airbag in the rear should be deactivated. Otherwise, there is a risk of considerable injury if the side airbag deploys.

Vehicles concerned: The following exceptions relating to the deactivation or reactivation of the airbag must be observed.

- E64 Production period: from series introduction until August 2005)

The different seat/seat belt system (SGS) means that the legal standard ECE-R21 "new" cannot be met. For technical reasons, the E64 cannot be approved in accordance with ECE-R21 "old", as in the case of the E46 Convertible. For this reason, it is not permissible to deactivate the front passenger airbag by means of conversion (encoding).

- E83 Production period: from September 2004

A modification to the front passenger airbag cover means that the front passenger airbag is no longer to be deactivated by conversion (encoding). For these vehicles, a key switch is available optionally and as a retrofit kit.

- R50/52/53 Vehicles with "JOHN COOPER WORKS sports seats":

The decisive document for installation is the installation instructions for "Retrofitting John Cooper Works sports seats". The vehicle's operating licence is **not** invalidated if "John Cooper Works sports seats" are retrofitted. The "JOHN COOPER WORKS sport seat" is an element of the European operating licence of the MINI (R50/R53). Approval of the installation by a technical control organization and entry into the vehicle documents is **not** required.

Thus, the following documentation in the appendices of the service information is not required when installing the "JOHN COOPER WORKS sport seats":

- Procedure for deactivation or reactivation of the airbags in the dealer organisation; Section "Documentation of the conversion" (Appendix 1)
- Documentation of the customer agreement and the performed work (Appendix 3)
- All BMW F-series, BMW i and MINI from R58:

In these vehicles, deactivation/activation of the airbags is only possible using a factory-installed key switch.

The key switch cannot be retrofitted!

It is not possible to deactivate/activate the airbags by means of conversion.

Procedure: Deactivating / reactivating airbags

Attention!

For vehicles with belt force limiter without key switch, the seat belt must be exchanged for a "seat belt **without** belt force limiter" when the front passenger airbag is deactivated.



It is not necessary to replace the seat belt in the E46/C.

If the front passenger airbag is reactivated, the seat belt must again be replaced with a "seat belt **with** belt force limiter" when the front passenger airbag is reactivated.

In **Australia and Korea** it is not permitted to deactivate the front passenger airbag.

For vehicles for which a **key switch** is available for deactivating/reactivating the airbags is optionally available, retrofit kits are also available for retrofitting a key switch (exception: all BMW F-series, BMW i, MINI from R58)

Tables 1 and 2 provide an overview of the measures needed for deactivating/reactivating the airbags and the acoustic seat belt warning, taking the stipulations for the specific models into account.

Attention!

The combination of certain equipment specifications, national-market versions and country-specific regulations may result in deviations to the data presented in Tables 1 and 2. If in doubt, contact Technical Support before carrying out any work.

Key:

- 1 - Deactivation occurs through a conversion with the diagnosis system.
- 2 - Deactivation takes place via a factory-installed or retrofitted key switch.
- 3 - Deactivation takes place via a factory-installed key switch, which cannot be retrofitted.

Table 1: Airbag deactivation/reactivation

Model series	Date of introduction	Front airbag		Side airbag		Head airbag		Remarks
		Driver	Passenger	Front	Rear	Front	Rear	
E34	From 09.93	1	1	1				Please refer to Enclosure 5.
E36	From 09.93	1	1	1				Please refer to Enclosure 6.
E36/Z3	from series production	1	1	1				
E38	from series production	1	1	1	1	1	1	
E39	from series production	1	1	1	1	1	1	
E46	from series production	1	1	1	1	1		
E52	from series production	1	1	1				
E53	from series production	1	1	1	1	1	1	
E60/E61	up to 08.05		1	1	1			
E60/E61	From 09.05		2	2	1			
E63	up to 08.05		1	1	1			
E63	From 09.05		2	2	1			
E64	up to 08.05			1	1			
E64	From 09.05		2	2	1			
E65/E66	from series production		1	1	1			



E70/71/72	from series production		2	2				
E81/82/88	from series production		2	2				
E83	up to 08.04		1	1	1			
E83	From 09.04		2	2	1			
E84	from series production		2	2				
E85/86	from series production		2	2				
E87	From 03.05		2	2				
E89	from series production		2	2				
E90/91/92/93	from series production		2	2				
R50/R53	up to 06.04		1	1		1		
R50/53	From 07.04		2	2		1		
R52	from series production		2	2				
R55/56/57	from series production		2	2				
MINI from R58	from series production		3	3				
BMW F-Series	from series production		3	3				
BMW i	from series production		3	3				

Deactivation/reactivation of acoustic seat belt warning

Deactivate and reactivate the acoustic seat belt warning for the driver and front passenger by conversion as per the table below.

Note:

Deactivating the acoustic seat belt warning is not permitted in Japan.

With the E53, the deactivation / reactivation of the acoustic seat belt warning on the front passenger side is only possible with the installation of a Light Check Module (LCM) / light module (LM) with a coding index 24 or higher (series from April 2005).

Deactivating the acoustic seat belt warning in R50/52/53 is not possible.

Table 2: Deactivating/reactivating the acoustic seat belt warning

<u>Model series</u>	<u>Driver and front passenger</u>	<u>Front passenger only</u>	<u>Remarks</u>
E53		1	
E70/71/72	1		only in conjunction with option 230
E60/61/63/64	1		
E65/66	1		
E81/82/87/88	1		



E83	1		
E84	1		
E85/86	1		
E89	1		
E90/91/92/93	1		
MINI from R55	1		
BMW F-Series	1		
BMW i	1		

Location of documents for deactivating or reactivating the airbag

- Procedure for deactivating and reactivating airbags in the dealer organisation: Please refer to Enclosure 1 .
- For how to encode the airbag control unit: Please refer to Enclosure 2 .
- For notes on documenting the customer's consent and the work carried out: Please refer to Enclosure 3 .
- Identification of airbag systems Please refer to Enclosure 4 .
- Deactivating or reactivating the airbags in E34 series vehicles Please refer to Enclosure 5 .
- Deactivating or reactivating the airbags in E36 series vehicles (excluding Z3) Please refer to Enclosure 6 .
- Deactivating or reactivating the acoustic seat belt warning Please refer to Enclosure 7

Note:

Only the airbags listed in the table can be deactivated.

- Deactivating or reactivating the airbags in series E36/Z3,38,39,46,52,53,60,61,63,65,66,83 (to August 2004), R50,53 (to July 2004) See repair instructions RAGRP72-7212DEAKTIV-OHNE
- Deactivating or reactivating the front passenger airbag using a key switch in series E60,61,63,64 (from September 2005) E83 (from September 2004), E87 (from March 2005) E85,70,90,91,92,93,R50,53 (from July 2004), R52 See repair instructions RAGRP72-7212DEAKTIV-WITH

Parts:

<u>Designation</u>	<u>Part number</u>	<u>Quantity</u>
Upper front seat belt without belt force limiter	See Electronic Parts Catalogue (EPC)	1
Sets of forms/parts, multilingual (with warning stickers)	01 39 0 028 759	1



Deactivating and reactivating airbags/acoustic seat belt reminder

All Series from model year 1994

Situation: If expressly desired by the customer and at the customer's responsibility, the following airbags can be deactivated and reactivated depending on the vehicle type:

- Driver's and front passenger airbag
- Front left and/or front right side airbags
- Rear left and/or rear right side airbags
- Front left and/or front right head airbags
- Rear left and/or rear right head airbags

Important note when travelling with children:

Children younger than 12 years of age or smaller than 150 cm may only travel if they are secured in suitable child restraint systems. Child restraint systems may only be used on the front passenger seat when the airbag is deactivated, as otherwise there is a substantial risk of injury to the children if the airbag is deployed, even if they are seated in a child restraint system. If it cannot be prevented that children lean out of their seat in the direction of the door trim panel, the side airbag in the rear should be deactivated. Otherwise, there is a risk of considerable injury if the side airbag deploys.

Vehicles concerned: The following exceptions relating to the deactivation or reactivation of the airbag must be observed.

- E64 Production period: from series introduction until August 2005)

The different seat/seat belt system (SGS) means that the legal standard ECE-R21 "new" cannot be met. For technical reasons, the E64 cannot be approved in accordance with ECE-R21 "old", as in the case of the E46 Convertible. For this reason, it is not permissible to deactivate the front passenger airbag by means of conversion (encoding).

- E83 Production period: from September 2004

A modification to the front passenger airbag cover means that the front passenger airbag is no longer to be deactivated by conversion (encoding). For these vehicles, a key switch is available optionally and as a retrofit kit.

- R50/52/53 Vehicles with "JOHN COOPER WORKS sports seats":

The decisive document for installation is the installation instructions for "Retrofitting John Cooper Works sports seats". The vehicle's operating licence is **not** invalidated if "John Cooper Works sports seats" are retrofitted. The "JOHN COOPER WORKS sport seat" is an element of the European operating licence of the MINI (R50/R53). Approval of the installation by a technical control organization and entry into the vehicle documents is **not** required.

Thus, the following documentation in the appendices of the service information is not required when installing the "JOHN COOPER WORKS sport seats":

- Procedure for deactivation or reactivation of the airbags in the dealer organisation; Section "Documentation of the conversion" (Appendix 1)
- Documentation of the customer agreement and the performed work (Appendix 3)
- All BMW F-series, BMW i and MINI from R58:

In these vehicles, deactivation/activation of the airbags is only possible using a factory-installed key switch.

The key switch cannot be retrofitted!

It is not possible to deactivate/activate the airbags by means of conversion.

Procedure: Deactivating / reactivating airbags

Attention!

For vehicles with belt force limiter without key switch, the seat belt must be exchanged for a "seat belt **without** belt force limiter" when the front passenger airbag is deactivated.



It is not necessary to replace the seat belt in the E46/C.

If the front passenger airbag is reactivated, the seat belt must again be replaced with a "seat belt **with** belt force limiter" when the front passenger airbag is reactivated.

In **Australia and Korea** it is not permitted to deactivate the front passenger airbag.

For vehicles for which a **key switch** is available for deactivating/reactivating the airbags is optionally available, retrofit kits are also available for retrofitting a key switch (exception: all BMW F-series, BMW i, MINI from R58)

Tables 1 and 2 provide an overview of the measures needed for deactivating/reactivating the airbags and the acoustic seat belt warning, taking the stipulations for the specific models into account.

Attention!

The combination of certain equipment specifications, national-market versions and country-specific regulations may result in deviations to the data presented in Tables 1 and 2. If in doubt, contact Technical Support before carrying out any work.

Key:

- 1 - Deactivation occurs through a conversion with the diagnosis system.
- 2 - Deactivation takes place via a factory-installed or retrofitted key switch.
- 3 - Deactivation takes place via a factory-installed key switch, which cannot be retrofitted.

Table 1: Airbag deactivation/reactivation

Model series	Date of introduction	Front airbag		Side airbag		Head airbag		Remarks
		Driver	Passenger	Front	Rear	Front	Rear	
E34	From 09.93	1	1	1				Please refer to Enclosure 5.
E36	From 09.93	1	1	1				Please refer to Enclosure 6.
E36/Z3	from series production	1	1	1				
E38	from series production	1	1	1	1	1	1	
E39	from series production	1	1	1	1	1	1	
E46	from series production	1	1	1	1	1		
E52	from series production	1	1	1				
E53	from series production	1	1	1	1	1	1	
E60/E61	up to 08.05		1	1	1			
E60/E61	From 09.05		2	2	1			
E63	up to 08.05		1	1	1			
E63	From 09.05		2	2	1			
E64	up to 08.05			1	1			
E64	From 09.05		2	2	1			
E65/E66	from series production		1	1	1			



E70/71/72	from series production		2	2				
E81/82/88	from series production		2	2				
E83	up to 08.04		1	1	1			
E83	From 09.04		2	2	1			
E84	from series production		2	2				
E85/86	from series production		2	2				
E87	From 03.05		2	2				
E89	from series production		2	2				
E90/91/92/93	from series production		2	2				
R50/R53	up to 06.04		1	1		1		
R50/53	From 07.04		2	2		1		
R52	from series production		2	2				
R55/56/57	from series production		2	2				
MINI from R58	from series production		3	3				
BMW F-Series	from series production		3	3				
BMW i	from series production		3	3				

Deactivation/reactivation of acoustic seat belt warning

Deactivate and reactivate the acoustic seat belt warning for the driver and front passenger by conversion as per the table below.

Note:

Deactivating the acoustic seat belt warning is not permitted in Japan.

With the E53, the deactivation / reactivation of the acoustic seat belt warning on the front passenger side is only possible with the installation of a Light Check Module (LCM) / light module (LM) with a coding index 24 or higher (series from April 2005).

Deactivating the acoustic seat belt warning in R50/52/53 is not possible.

Table 2: Deactivating/reactivating the acoustic seat belt warning

<u>Model series</u>	<u>Driver and front passenger</u>	<u>Front passenger only</u>	<u>Remarks</u>
E53		1	
E70/71/72	1		only in conjunction with option 230
E60/61/63/64	1		
E65/66	1		
E81/82/87/88	1		



E83	1		
E84	1		
E85/86	1		
E89	1		
E90/91/92/93	1		
MINI from R55	1		
BMW F-Series	1		
BMW i	1		

Location of documents for deactivating or reactivating the airbag

- Procedure for deactivating and reactivating airbags in the dealer organisation: Please refer to Enclosure 1 .
- For how to encode the airbag control unit: Please refer to Enclosure 2 .
- For notes on documenting the customer's consent and the work carried out: Please refer to Enclosure 3 .
- Identification of airbag systems Please refer to Enclosure 4 .
- Deactivating or reactivating the airbags in E34 series vehicles Please refer to Enclosure 5 .
- Deactivating or reactivating the airbags in E36 series vehicles (excluding Z3) Please refer to Enclosure 6 .
- Deactivating or reactivating the acoustic seat belt warning Please refer to Enclosure 7

Note:

Only the airbags listed in the table can be deactivated.

- Deactivating or reactivating the airbags in series E36/Z3,38,39,46,52,53,60,61,63,65,66,83 (to August 2004), R50,53 (to July 2004) See repair instructions RAGRP72-7212DEAKTIV-OHNE
- Deactivating or reactivating the front passenger airbag using a key switch in series E60,61,63,64 (from September 2005) E83 (from September 2004), E87 (from March 2005) E85,70,90,91,92,93,R50,53 (from July 2004), R52 See repair instructions RAGRP72-7212DEAKTIV-WITH

Parts:

<u>Designation</u>	<u>Part number</u>	<u>Quantity</u>
Upper front seat belt without belt force limiter	See Electronic Parts Catalogue (EPC)	1
Sets of forms/parts, multilingual (with warning stickers)	01 39 0 028 759	1



Deactivating and reactivating airbags/acoustic seat belt reminder

All Series from model year 1994

Situation: If expressly desired by the customer and at the customer's responsibility, the following airbags can be deactivated and reactivated depending on the vehicle type:

- Driver's and front passenger airbag
- Front left and/or front right side airbags
- Rear left and/or rear right side airbags
- Front left and/or front right head airbags
- Rear left and/or rear right head airbags

Important note when travelling with children:

Children younger than 12 years of age or smaller than 150 cm may only travel if they are secured in suitable child restraint systems. Child restraint systems may only be used on the front passenger seat when the airbag is deactivated, as otherwise there is a substantial risk of injury to the children if the airbag is deployed, even if they are seated in a child restraint system. If it cannot be prevented that children lean out of their seat in the direction of the door trim panel, the side airbag in the rear should be deactivated. Otherwise, there is a risk of considerable injury if the side airbag deploys.

Vehicles concerned: The following exceptions relating to the deactivation or reactivation of the airbag must be observed.

- E64 Production period: from series introduction until August 2005)

The different seat/seat belt system (SGS) means that the legal standard ECE-R21 "new" cannot be met. For technical reasons, the E64 cannot be approved in accordance with ECE-R21 "old", as in the case of the E46 Convertible. For this reason, it is not permissible to deactivate the front passenger airbag by means of conversion (encoding).

- E83 Production period: from September 2004

A modification to the front passenger airbag cover means that the front passenger airbag is no longer to be deactivated by conversion (encoding). For these vehicles, a key switch is available optionally and as a retrofit kit.

- R50/52/53 Vehicles with "JOHN COOPER WORKS sports seats":

The decisive document for installation is the installation instructions for "Retrofitting John Cooper Works sports seats". The vehicle's operating licence is **not** invalidated if "John Cooper Works sports seats" are retrofitted. The "JOHN COOPER WORKS sport seat" is an element of the European operating licence of the MINI (R50/R53). Approval of the installation by a technical control organization and entry into the vehicle documents is **not** required.

Thus, the following documentation in the appendices of the service information is not required when installing the "JOHN COOPER WORKS sport seats":

- Procedure for deactivation or reactivation of the airbags in the dealer organisation; Section "Documentation of the conversion" (Appendix 1)
- Documentation of the customer agreement and the performed work (Appendix 3)
- All BMW F-series, BMW i and MINI from R58:

In these vehicles, deactivation/activation of the airbags is only possible using a factory-installed key switch.

The key switch cannot be retrofitted!

It is not possible to deactivate/activate the airbags by means of conversion.

Procedure: Deactivating / reactivating airbags

Attention!

For vehicles with belt force limiter without key switch, the seat belt must be exchanged for a "seat belt **without** belt force limiter" when the front passenger airbag is deactivated.



It is not necessary to replace the seat belt in the E46/C.

If the front passenger airbag is reactivated, the seat belt must again be replaced with a "seat belt **with** belt force limiter" when the front passenger airbag is reactivated.

In **Australia and Korea** it is not permitted to deactivate the front passenger airbag.

For vehicles for which a **key switch** is available for deactivating/reactivating the airbags is optionally available, retrofit kits are also available for retrofitting a key switch (exception: all BMW F-series, BMW i, MINI from R58)

Tables 1 and 2 provide an overview of the measures needed for deactivating/reactivating the airbags and the acoustic seat belt warning, taking the stipulations for the specific models into account.

Attention!

The combination of certain equipment specifications, national-market versions and country-specific regulations may result in deviations to the data presented in Tables 1 and 2. If in doubt, contact Technical Support before carrying out any work.

Key:

- 1 - Deactivation occurs through a conversion with the diagnosis system.
- 2 - Deactivation takes place via a factory-installed or retrofitted key switch.
- 3 - Deactivation takes place via a factory-installed key switch, which cannot be retrofitted.

Table 1: Airbag deactivation/reactivation

Model series	Date of introduction	Front airbag		Side airbag		Head airbag		Remarks
		Driver	Passenger	Front	Rear	Front	Rear	
E34	From 09.93	1	1	1				Please refer to Enclosure 5.
E36	From 09.93	1	1	1				Please refer to Enclosure 6.
E36/Z3	from series production	1	1	1				
E38	from series production	1	1	1	1	1	1	
E39	from series production	1	1	1	1	1	1	
E46	from series production	1	1	1	1	1		
E52	from series production	1	1	1				
E53	from series production	1	1	1	1	1	1	
E60/E61	up to 08.05		1	1	1			
E60/E61	From 09.05		2	2	1			
E63	up to 08.05		1	1	1			
E63	From 09.05		2	2	1			
E64	up to 08.05			1	1			
E64	From 09.05		2	2	1			
E65/E66	from series production		1	1	1			



E70/71/72	from series production		2	2				
E81/82/88	from series production		2	2				
E83	up to 08.04		1	1	1			
E83	From 09.04		2	2	1			
E84	from series production		2	2				
E85/86	from series production		2	2				
E87	From 03.05		2	2				
E89	from series production		2	2				
E90/91/92/93	from series production		2	2				
R50/R53	up to 06.04		1	1		1		
R50/53	From 07.04		2	2		1		
R52	from series production		2	2				
R55/56/57	from series production		2	2				
MINI from R58	from series production		3	3				
BMW F-Series	from series production		3	3				
BMW i	from series production		3	3				

Deactivation/reactivation of acoustic seat belt warning

Deactivate and reactivate the acoustic seat belt warning for the driver and front passenger by conversion as per the table below.

Note:

Deactivating the acoustic seat belt warning is not permitted in Japan.

With the E53, the deactivation / reactivation of the acoustic seat belt warning on the front passenger side is only possible with the installation of a Light Check Module (LCM) / light module (LM) with a coding index 24 or higher (series from April 2005).

Deactivating the acoustic seat belt warning in R50/52/53 is not possible.

Table 2: Deactivating/reactivating the acoustic seat belt warning

<u>Model series</u>	<u>Driver and front passenger</u>	<u>Front passenger only</u>	<u>Remarks</u>
E53		1	
E70/71/72	1		only in conjunction with option 230
E60/61/63/64	1		
E65/66	1		
E81/82/87/88	1		



E83	1		
E84	1		
E85/86	1		
E89	1		
E90/91/92/93	1		
MINI from R55	1		
BMW F-Series	1		
BMW i	1		

Location of documents for deactivating or reactivating the airbag

- Procedure for deactivating and reactivating airbags in the dealer organisation: Please refer to Enclosure 1 .
- For how to encode the airbag control unit: Please refer to Enclosure 2 .
- For notes on documenting the customer's consent and the work carried out: Please refer to Enclosure 3 .
- Identification of airbag systems Please refer to Enclosure 4 .
- Deactivating or reactivating the airbags in E34 series vehicles Please refer to Enclosure 5 .
- Deactivating or reactivating the airbags in E36 series vehicles (excluding Z3) Please refer to Enclosure 6 .
- Deactivating or reactivating the acoustic seat belt warning Please refer to Enclosure 7

Note:

Only the airbags listed in the table can be deactivated.

- Deactivating or reactivating the airbags in series E36/Z3,38,39,46,52,53,60,61,63,65,66,83 (to August 2004), R50,53 (to July 2004) See repair instructions RAGRP72-7212DEAKTIV-OHNE
- Deactivating or reactivating the front passenger airbag using a key switch in series E60,61,63,64 (from September 2005) E83 (from September 2004), E87 (from March 2005) E85,70,90,91,92,93,R50,53 (from July 2004), R52 See repair instructions RAGRP72-7212DEAKTIV-WITH

Parts:

<u>Designation</u>	<u>Part number</u>	<u>Quantity</u>
Upper front seat belt without belt force limiter	See Electronic Parts Catalogue (EPC)	1
Sets of forms/parts, multilingual (with warning stickers)	01 39 0 028 759	1



00 02 06 (296)

Drawbar load sign omitted

All with options 235 and 3AC

Situation:

There have been new vehicle documents since 2005-10-01.

Beginning with this production date, vehicles no longer need to be equipped with the trailer hitch drawbar load sign.

Corresponding information on the options is provided in the vehicle documents.

The regulation pertains to all series.



Master document for airbag/belt tensioner

All model series

Situation: The volume of information about the airbag/belt tensioner topic has greatly increased in the past few years due to technical innovations. To simplify the targeted search for information, this document contains a summary of all important information about the handling of airbags/belt tensioners at the dealer's operation and can be accessed directly using hotspot.

Procedure: Search for a topic in the table below and select a document with hotspot.

1. Fault memory / airbag indicator light

"Airbag with seat occupancy detection"	SI 65 04 96 (064)
Side airbag: Troubleshooting 05/06 (MRS3) or fault code 08/09 (MRS)"	SI 65 03 00 (573)
"Airbag fault code 01/0D (MRS3): Driver's airbag"	SI 65 07 00 (603)

2. Repair

"Repair of airbag systems that have been activated"	SI 65 09 89 (126)
"Airbag, repair instructions for ignition circuits"	SI 61 01 99 (397)
"Airbag: Repair instructions for the ignition circuit, belt tensioner and/or side airbag"	SI 61 01 03 (952)
"Airbag control unit replacement"	SI 65 10 96 (129)

3. Deactivation / recoding

"Deactivated side airbags in the rear passenger compartment"	SI 65 07 99 (442)
"Recode the airbag control unit"	SI 65 37 01 (000)
"Check side airbag impact sensors and recode the airbag control unit"	SI 65 39 01 (000)
"Recode the airbag control unit"	SI 65 40 01 (000)
"Deactivation or reactivation of airbags / belt warning sound"	SI 65 13 00 (641)



41 01 08 (452)

New BMW paint brochure

All

Presentation of BMW paint brochure:

The existing BMW paint brochure has been thoroughly revised and in its new form provides good reference for assessing all kinds of paint and corrosion damage.

The examples and detailed descriptions contained in the brochure are intended to find a standard language for identifying paint and corrosion damage. Unambiguous descriptions of damage mean that misinterpretations can be largely ruled out when assessing a possible warranty claim. Communication between the customer and the authorised BMW dealer during assessment on the vehicle is also made greatly easier.

If for example the following damage is unambiguously identified on the paint surface, this will always be considered to be the responsibility of the customer, and warranty will be ruled out:

- Mechanical influences on the paint surface (e.g. scratches)
- Damage to the paint surface caused by chemical or biological influences (e.g. animal droppings)

The new BMW paint brochure complements the BMW paint handbook when eliminating paint and corrosion damage. This means that the repair procedures described in the BMW paint handbook are adapted unambiguously and purposefully to the fault pattern.

Subsequent orders for BMW paint brochure:

The BMW paint brochure can be ordered via the usual parts-related channel under the BMW parts number 01 29 2 148 332.



41 01 08 (452)

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00 00 Extract from BMW Group Standard GS 90003-2

Tightening Torques

	Type	Thread	Tightening specifications	Torque
If there are no cross-references to tightening torques in the repair instructions, the extracts based on BMW Group Standard GS 90003-2 must be observed.				
<p>A distinction is made between screws / bolts / nuts with surface colour / (surface coating) yellow (ZN) and silver (ZNS)</p> <p>The maximum tightening torques are:</p> <p>Surface colour yellow (ZN):</p> <p>Applicable only to set screws with metric coarse and fine threads to DIN 13-28 and nuts with nut height of $0.8 \times d$ to DIN 934 and exclusively for a total $\mu = 0.125$ (screws/bolts phosphatised, nuts untreated or galvanized. Lubricated condition: both unlubricated and oiled).</p>				
<p>Surface colour silver (ZNS):</p> <p>Applicable only to set screws with metric coarse and fine threads to DIN 13-28 and nuts with nut height of $0.8 \times d$ to DIN 934 and exclusively for a μ range = 0.09 0.15 (screws/bolts cadmium-plated, nuts untreated or galvanized. Lubricated condition: both unlubricated and oiled).</p> <p>The values specified in the table apply to a screw/screw connection in accordance with the above-mentioned conditions.</p> <p>Not applicable when a different thread surface or lubrication status is used or in the case of deviating nut height.</p>				



<p>Also not applicable to screws/bolts reduced shafts, to self-locking screw/bolt connections and to screwing/bolting parts made of different materials.</p> <p>Caution!</p> <p>It is essential to adhere to the prescribed tightening torques in order to carry out a correct and proper repair. This presupposes that the torque wrenches required for this purpose are subject to regular testing.</p> <p>Permitted tolerance of calibrated torque wrenches is $\pm 4\%$ from the scale value.</p> <p>Approved torque wrenches and torque testers are featured in the Workshop Equipment Planning Catalogue.</p>				
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00 00 M10 and M10 x 1 - maximum tightening torques acc. to BMW GS 90003-2**Tightening Torques**

	Type	Thread	Tightening specification	Torque
Scope of applicability of tightening torques, refer to excerpt from company standard BMW GS 90003-2	Surface colour / (surface coating)			
M10 thread	yellow (ZN)	M10 8.8		47 Nm
	silver (ZNS)	M10 8.8		38 Nm
	yellow (ZN)	M10 10.9		66 Nm
	silver (ZNS)	M10 10.9		56 Nm
	yellow (ZN)	M10 12.9		79 Nm
	silver (ZNS)	M10 12.9		62 Nm
M10x1 thread	yellow (ZN)	M10 x 1 8.8		54 Nm
	silver (ZNS)	M10 x 1 8.8		41 Nm
	yellow (ZN)	M10 x 1 10.9		75 Nm
	silver (ZNS)	M10 x 1 10.9		60 Nm
	yellow (ZN)	M10 x 1 12.9		91 Nm
	silver (ZNS)	M10 x 1 12.9		67 Nm



00 00 M12 and M12x1.5 - maximum tightening torques acc. to BMW GS 90003-2

Tightening Torques

	Type	Thread	Tightening specification	Torque
Scope of applicability of tightening torques, refer to excerpt from company standard BMW GS 90003-2	Surface colour / (surface coating)			
M12 thread	yellow (ZN)	M12 8.8		82 Nm
	silver (ZNS)	M12 8.8		66 Nm
	yellow (ZN)	M12 10.9		115 Nm
	silver (ZNS)	M12 10.9		98 Nm
	yellow (ZN)	M12 12.9		140 Nm
	silver (ZNS)	M12 12.9		108 Nm
M12x1.5 thread	yellow (ZN)	M12 x 1.5 8.8		87 Nm
	silver (ZNS)	M12 x 1.5 8.8		68 Nm
	yellow (ZN)	M12 x 1.5 10.9		123 Nm
	silver (ZNS)	M12 x 1.5 10.9		100 Nm
	yellow (ZN)	M12 x 1.5 12.9		147 Nm
	silver (ZNS)	M12 x 1.5 12.9		110 Nm



00 00 M14 and M14x1.5 - maximum tightening torques acc. to BMW GS 90003-2**Tightening Torques**

	Type	Thread	Tightening specification	Torque
Scope of applicability of tightening torques, refer to excerpt from company standard BMW GS 90003-2	Surface colour / (surface coating)			
M14 thread	yellow (ZN)	M14 8.8		130 Nm
	silver (ZNS)	M14 8.8		104 Nm
	yellow (ZN)	M14 10.9		180 Nm
	silver (ZNS)	M14 10.9		155 Nm
	yellow (ZN)	M14 12.9		220 Nm
	silver (ZNS)	M14 12.9		170 Nm
M14x1.5 thread	yellow (ZN)	M14 x 1.5 8.8		143 Nm
	silver (ZNS)	M14 x 1.5 8.8		110 Nm
	yellow (ZN)	M14 x 1.5 10.9		200 Nm
	silver (ZNS)	M14 x 1.5 10.9		165 Nm
	yellow (ZN)	M14 x 1.5 12.9		240 Nm
	silver (ZNS)	M14 x 1.5 12.9		180 Nm



00 00 M16 and M16x1.5 - maximum tightening torques acc. to BMW GS 90003-2

Tightening Torques

	Type	Thread	Tightening specification	Torque
Scope of applicability of tightening torques, refer to excerpt from company standard BMW GS 90003-2	Surface colour / (surface coating)			
M16 thread	yellow (ZN)	M16 8.8		200 Nm
	silver (ZNS)	M16 8.8		160 Nm
	yellow (ZN)	M16 10.9		280 Nm
	silver (ZNS)	M16 10.9		235 Nm
	yellow (ZN)	M16 12.9		340 Nm
	silver (ZNS)	M16 12.9		260 Nm
M16x1.5 thread	yellow (ZN)	M16 x 1.5 8.8		216 Nm
	silver (ZNS)	M16 x 1.5 8.8		170 Nm
	yellow (ZN)	M16 x 1.5 10.9		303 Nm
	silver (ZNS)	M16 x 1.5 10.9		250 Nm
	yellow (ZN)	M16 x 1.5 12.9		364 Nm
	silver (ZNS)	M16 x 1.5 12.9		275 Nm



00 00 M18 and M18x1.5 - maximum tightening torques acc. to BMW GS 90003-2

Tightening Torques

	Type	Thread	Tightening specification	Torque
Scope of applicability of tightening torques, refer to excerpt from company standard BMW GS 90003-2	Surface colour / (surface coating)			
M18 thread	yellow (ZN)	M18 8.8		280 Nm
	silver (ZNS)	M18 8.8		225 Nm
	yellow (ZN)	M18 10.9		390 Nm
	silver (ZNS)	M18 10.9		330 Nm
	yellow (ZN)	M18 12.9		470 Nm
	silver (ZNS)	M18 12.9		365 Nm
M18x1.5 thread	yellow (ZN)	M18 x 1.5 8.8		313 Nm
	silver (ZNS)	M18 x 1.5 8.8		245 Nm
	yellow (ZN)	M18 x 1.5 10.9		440 Nm
	silver (ZNS)	M18 x 1.5 10.9		360 Nm
	yellow (ZN)	M18 x 1.5 12.9		527 Nm
	silver (ZNS)	M18 x 1.5 12.9		400 Nm



00 00 M4 and M5 - maximum tightening torques acc. to BMW GS 90003-2

Tightening Torques

	Type	Thread	Tightening specification	Torque
Scope of applicability of tightening torques, refer to excerpt from company standard BMW GS 90003-2	Surface colour / (surface coating)			
M4 thread	yellow (ZN)	M4 8.8		3 Nm
	silver (ZNS)	M4 8.8		2 Nm
	yellow (ZN)	M4 10.9		4 Nm
	silver (ZNS)	M4 10.9		3 Nm
	yellow (ZN)	M4 12.9		5 Nm
M5 thread	yellow (ZN)	M5 8.8		6 Nm
	silver (ZNS)	M5 8.8		5 Nm
	yellow (ZN)	M5 10.9		8 Nm
	silver (ZNS)	M5 10.9		7 Nm
	yellow (ZN)	M5 12.9		10 Nm
	silver (ZNS)	M5 12.9		8 Nm



00 00 M6 and M7 - maximum tightening torques acc. to BMW GS 90003-2

Tightening Torques

	Type	Thread	Tightening specification	Torque
Scope of applicability of tightening torques, refer to excerpt from company standard BMW GS 90003-2	Surface colour / (surface coating)			
M6 thread	yellow (ZN)	M6 8.8		10 Nm
	silver (ZNS)	M6 8.8		8 Nm
	yellow (ZN)	M6 10.9		14 Nm
	silver (ZNS)	M6 10.9		12 Nm
	yellow (ZN)	M6 12.9		17 Nm
	silver (ZNS)	M6 12.9		13 Nm
M7 thread	yellow (ZN)	M7 8.8		15 Nm
	silver (ZNS)	M7 8.8		13 Nm
	yellow (ZN)	M7 10.9		21 Nm
	silver (ZNS)	M7 10.9		19 Nm
	yellow (ZN)	M7 12.9		26 Nm
	silver (ZNS)	M7 12.9		21 Nm



00 00 M8 and M8 x 1 - maximum tightening torques acc. to BMW GS 90003-2**Tightening Torques**

	Type	Thread	Tightening specification	Torque
Scope of applicability of tightening torques, refer to excerpt from company standard BMW GS 90003-2	Surface colour / (surface coating)			
M8 thread	yellow (ZN)	M8 8.8		24 Nm
	silver (ZNS)	M8 8.8		19 Nm
	yellow (ZN)	M8 10.9		34 Nm
	silver (ZNS)	M8 10.9		28 Nm
	yellow (ZN)	M8 12.9		40 Nm
	silver (ZNS)	M8 12.9		32 Nm
M8x1 thread	yellow (ZN)	M8 x 1 8.8		26 Nm
	silver (ZNS)	M8 x 1 8.8		21 Nm
	yellow (ZN)	M8 x 1 10.9		36 Nm
	silver (ZNS)	M8 x 1 10.9		30 Nm
	yellow (ZN)	M8 x 1 12.9		44 Nm
	silver (ZNS)	M8 x 1 12.9		33 Nm



0 operating fluid overview

Expendable materials

Fitting aid (Circo Light; lubricant)	250 ml, Bottle	83192405829
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Expendable materials

Lubricating grease Renolit CX-SP 1	100 g, Tube	83192183737
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Expendable materials

Lubricating grease Klübersynth LF 44-22	45 g, Tube	83230396713
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Expendable materials

Ball bearing grease	100 g, Tube	81229407174
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Expendable materials

Lubricating oil 4 UH 1 - 460 N	100 ml, Bottle	83230306232
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Expendable materials

Wheel bearing grease UNIREX N3	400 ml, Cartridge	83192160349
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Expendable materials

Lubricating grease MI-Setral-43 N	50 g, Tube	83232152082
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Expendable materials

Lubricating grease GKY H-15	100 g, Bag	83232179705
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Expendable materials

Lubricating grease One Lube Improved	110 g, Bag	83232179708
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Expendable materials

Silicone spray	400 ml, Spray can	83192208609
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Expendable materials

Universal lubricant spray	250 ml, Spray can	81229407711
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Expendable materials



Adhesive lubricant	250 ml, Spray can	81229407629
Expendable materials		
Door brake lubricating grease	400 ml, Spray can	83230301796
Expendable materials		
Lubricating material Optimoly Paste TA	400 ml, Spray can	83239407817
Expendable materials		
Quietsch-Ex	250 ml, Spray can	83230420633
Expendable materials		
Lubricating grease Klüberplex BE 11-462	400 ml, Spray can	83220397761
Expendable materials		
Fluropan T20 spray with PTFE	400 ml, Spray can	83230154884
Expendable materials		
Lubricating grease Renolit CX-CVM 1	100 g, Bag	83192286016
Expendable materials		
Lubricating grease Renolit CX-CVL 1	100 g, Bag	83192286017
Expendable materials		
Lubricating grease Renolit CX-TP 1	100 g, Bag	83192286018
Expendable materials		
Paste MP 3	100 g, Tube	07559062476
Expendable materials		
Active rust film remover	500 ml, Spray can	83192211267
Expendable materials		
Contact-protection greaseKF1	50 g, Tube	83192295229
Expendable materials		



Special lubricant KRYTOX	30 ml, Bottle	83199408523
Paints and colours		
BMW sound insulating paint 1	50 g, Spray	83192414997
Paints and colours		
Sound insulating paint Berucoat AK 978	100 ml, Spray can	83192358109
Sealing compound		
Silicone sealant Drei Bond 1207	310 ml, Cartridge	81229407439
Sealing compound		
Surface sealant Loctite 574	50 ml, Bottle	81229407301
Sealing compound		
Surface sealant Loctite 5203	50 ml, Cartridge	83190422969
Sealing compound		
Surface sealant 2054/2	12 g, Cartridge	83190412375
Sealing compound		
Special activator type 5900	10 ml, Bottle	83190412376
Adhesive		
Adhesive anaerobic Drei Bond 1385	50 g, Bottle	83190417376
Adhesive		
Adhesive Loctite 577	50 ml, Bottle	33112328736
Sealing compound		
Surface sealant Loctite 518	50 ml, Cartridge	83190395783
Sealing compound		
Loctite 5460 liquid sealing compound	50 ml, Cartridge	83192420102



Adhesive

Screw lock Loctite Stick 268, high strength	19 g, Pin	83190441108
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Adhesive

Screw lock Loctite 270, high strength	10 ml, Bottle	83192210337
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Adhesive

Screw lock Loctite 243, medium strength	10 ml, Bottle	83192210339
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Adhesive

Screw lock Loctite 277, high strength	250 ml, Bottle	83190142917
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Adhesive

Screw lock Loctite 273, high strength	50 ml, Bottle	83190443083
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Adhesive

Profile rubber adhesive
No longer available from BMW.

Adhesive

Adhesive Loctite 638	50 ml, Bottle	81229407420
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Adhesive

Adhesive Loctite 2701	10 ml, Bottle	33172331095
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Adhesive

Adhesive 2K Loctite 3450	25 ml, Bottle	51252313730
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Adhesive

BMW Glue Pen	10 g, Pin	81222358167
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Adhesive

SuperglueS1	20 g, Bottle	81222351255
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Adhesive

SuperglueS2	20 g, Bottle	81222351257
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Adhesive

SuperglueS3	3 g, Bottle	81222351258
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Expendable materials

Cooling spray	400 ml, Spray can	83199407762
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Expendable materials

Odour remover	100 ml, Spray can	83192233353
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Expendable materials

Rust film remover Professional	5 l, Canister	83192166998
	200 l, Barrel	83120396936
	1000 l, Barrel	83120396937

Expendable materials

Rust film remover Rv26H	500 ml, Spray bottle	83120414441
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Expendable materials

Preservative remover	60 l, Canister	83190422208
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Expendable materials

Universal cleaner exterior	10 l, Canister	83192153221
	25 l, Canister	83192154648

Expendable materials

Stain remover	1 l, Can	83119407816
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Expendable materials

Adhesive remover	1 l, Can	83110009712
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Expendable materials

Universal cleaner interior	20 l, Canister	83192154638
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Care product

Wheel rim brushes	1x, Set	83192298237
Sealing compound		
Loctite 171000 primer	4 ml, Bottle	83197515683
Overview of consumables (Electronic Parts Catalogue)		
Sealing compound		
Loctite 193140 liquid sealing compound	6 ml, Cartridge	83190439030
Overview of consumables (Electronic Parts Catalogue)		
Sealing compound		
Sealant Dow Corning	35 ml, Tube	07580397777
Overview of consumables (Electronic Parts Catalogue)		
Adhesive		
Adhesive Loctite 648	50 ml, Bottle	07589067732
Overview of consumables (Electronic Parts Catalogue)		
Expendable materials		
Engine and cold cleaner	1 l, Spray bottle	83192360950
	10 l, Canister	83192361705
Overview of consumables (Electronic Parts Catalogue)		
Expendable materials		
Leak detection spray	400 ml, Spray can	83199407861
Overview of consumables (Electronic Parts Catalogue)		
Expendable materials		
Contact spray	250 ml, Spray can	83222405599
Overview of consumables (Electronic Parts Catalogue)		
Expendable materials		
Powder spray	300 ml, Spray can	83192358648
Expendable materials		
Vacuum pump oil	1 l, Bottle	83192232502
Expendable materials		



Lubricants PF1	50 g, Pin	83230309627
Expendable materials		
Injector lubricating grease	50 g, Can	83230441070
Adhesive		
Screw lock Loctite Stick 248, medium strength	19 g, Pin	83192359746
Expendable materials		
Universal cleaner	20 l, Canister	83192360981



1100 Overview of tightening torques

Standard screw connection 4 Nm		
Oval-head screw	Tightening torque	4Nm
Standard screw connection M10		
M10		38Nm
Standard screw connection M5		
M5		5Nm
Standard screw connection M6		
M6		8Nm
Standard screw connection M7		
M7		13Nm
Standard screw connection M8		
M8	Tightening torque	19Nm
Standard screw connection hose clamp 5		
Hose clamp L12 - L15	Tightening torque	1,25Nm



11 11 Engine block

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1 Main bearing screws, observe AZ tightening specification.	N18	M9x115	Renew screws. Jointing torque Angle of rotation	30 Nm 150 °
2 Bedplate, observe tightening AZ specification.	N18	M6x35 / M6x55	Renew screws. Jointing torque	9 Nm
3 Screw plug, gear case upper AZ section.	N18	M22x1.5		35 Nm
4 Screw plug, gear case lower AZ section.	N18	M16x1.5	Renew gasket.	32 Nm
5 AZ Oil spray nozzle to crankcase.	N18	M10		20 Nm
6 Air conditioning compressor AZ fixing.	N18	M8		8 Nm
7 Retaining bolt (catalytic AZ converter) to crankcase.	N18	M8	Bolt	10 Nm
8AZ Oil drain/filler plug of crankcase to the side	N18	M16x1.5	Renew gasket	32 Nm



11 12 Cylinder head with lid

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1 AZ Cylinder head bolts 10.9	N18	M8x95	Renew screws. Jointing torque 1. Angle of rotation 2. Angle of rotation	15 Nm 90 째 90 째
2 AZ Cylinder head bolts	N18	M10x145	Renew screws. Jointing torque 1. Angle of rotation 2. Angle of rotation	30 Nm 90 째 90 째
3 AZ Cylinder head bolts	N18	M8x35	Renew screws.	30 Nm
4 AZ Cylinder head cover to cylinder head	N18	M6x30		10 Nm
5 AZ Earth cable to cylinder head cover	N18	M6 / M5		10 Nm
6 AZ Bearing support of eccentric shaft to cylinder head	N18	M6x40 M6x70		10 Nm
7 AZ Intake camshaft bearing cap to bearing support	N18	M6x30		10 Nm
8 AZ Exhaust camshaft bearing cap to cylinder head	N18	M6x40		10 Nm
9 AZ Lifting eye to cylinder head	N18	M8x20 M8x25		20 Nm
10 AZ VVT sensor to cylinder head	N18	M6x40		10 Nm
11 AZ High pressure pump transmission mounting bracket screw connection	N18	M6x50		9 Nm



11 13 Oil sump

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1 AZ Oil drain plug	N18	M18 x 1.5	Renew gasket.	30 Nm
2 AZ Oil sump to crankcase	N18	M6x16		12 Nm
3 AZ Oil deflector to engine block.	N18	M6x16		10 Nm



1114 Overview of Technical Data

Processing time of liquid sealing compound	
	< 12 min



11 21 Crankshaft and Bearings

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Torsional vibration damper (hub) to crankshaft (central bolt 12.9)	N18	M14 x1.5 x74	Replace screws. Lightly oil screws and threads. Jointing torque Angle of rotation	50 Nm 180 °



11 22 Flywheel

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Flywheel to crankshaft (automatic transmission)	N18	M9x1.25	Replace screws. 1. Jointing torque 2. Jointing torque 3. Final tightening	8 Nm 30 Nm 90 °
2AZ Dual-mass flywheel to crankshaft (manual gearbox)	N18	M9x1.25	Replace screw.T55 1. Jointing torque 2. Jointing torque 3. Final tightening	8 Nm 30 Nm 90 °



11 23 Vibration damper

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1 Torsional vibration damper to AZ crankshaft hub.	N18	M8x16		28 Nm



11 24 Connecting Rods and Bearings

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Connecting rod bolts	N18	M7x37	Replace, wash and oil screws. 1. Jointing torque 2. Jointing torque 3. Angle of rotation	5 Nm 15 Nm 130 °



11 28 Drive belt with tension and deflecting element

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1 AZ Belt tensioner to alternator	N18	M8x110		20 Nm
2 AZ Friction gear to crankcase	N18	M6x20		8 Nm



11 31 Camshaft

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1 AZ Guide rail, crankcase	N18	M8 x 1.25	Replace sealing ring.	24 Nm
2 AZ Guide rail to cylinder head	N18	M14 x 1.5	Replace sealing ring.	25 Nm
3 AZ Line to cylinder head	N18	M6 x 20		9 Nm
4 AZ Chain tensioner to cylinder head	N18	M22 M22 x 1.5	Do not retighten the chain tensioner. Replace sealing ring.	80 Nm



11 36 Variable camshaft control

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1 VANOS to inlet and exhaust AZ camshafts	N18	M10 x 1 x 52	Replace screw. Jointing torque Angle of rotation	20 Nm 180 °
2 Non-return valve VANOS to AZ cylinder head	N18	M14 x 1.5	Replace sealing ring.	13 Nm
3 Solenoid valve holder to AZ crankcase	N18	M6 x 16		9 Nm



11 37 Variable valve gear

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1 Fitting screw for guide block to AZ cylinder head	N18	M6x35		10 Nm
2 AZ Gate to cylinder head	N18	M6x28		10 Nm
3 AZ Return spring to cylinder head	N18	M6x20		10 Nm
4 Electric servodrive to cylinder AZ head	N18	M6x15		8 Nm
5 Sensor wheel (magnet sensor) AZ to camshaft	N18	M6x20		8 Nm
6 Eccentric shaft sensor to AZ cylinder head	N18	M6x12		8.5 Nm



11 41 Oil pump with strainer and motor

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1 AZ Oil pump to bedplate	N18	M8x28		25 Nm
2 AZ Sprocket to oil pump	N18	M8x35	Replace screw. Jointing torque Angle of rotation	5 Nm 90 °
3 AZ Oil pump cable clip	N18	M5x12		4 Nm
4AZ Solenoid valve to oil pump	N18	M6x20		8 Nm
5AZ Locking panel on counter support	N18	M5x12		4 Nm



11- 42 Oil Filter and Lines

Tightening Torques

		Type	Thread	Tightening specifications	Torque
1 AZ	Oil filter cover to oil filter housing	N18	S90 x 4	Replace sealing ring.	25 Nm
2 AZ	Oil filter housing to cylinder head	N18	M6 x 100	Replace seal.	10 Nm



11- 43 Oil dipstick

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1 AZ Oil dipstick to cylinder head	N18			9 Nm



11 51 Coolant pump with drive

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1 AZ Coolant pump to crankcase	N18	M6 x 30	Replace seal.	9 Nm
2 Water pump gear to coolant AZ pump	N18	M6 x 12		8 Nm



11 53 Thermostat and Connections

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Thermostat housing to cylinder head	N14	M6		8 Nm
2AZ Vapour separator to crankcase	N14	M6x100		8 Nm
3AZ Auxiliary coolant pump	N14 / N18	M6		8 Nm
4AZ Banjo bolt for feed and reverse on exhaust turbocharger	N14	M14x1,5	Renew the sealing ring.	35 Nm



11 53 Thermostat and Connections
Tightening Torques

	Type	Thread	Tightening specifications	Torque
1 Thermostat housing to cylinder AZ head	N18	M6		8 Nm



11 61 Intake plenum
Tightening Torques

	Type	Thread	Tightening specifications	Torque
1 Intake manifold to cylinder AZ head	N18	M8 x 125		15 Nm
	N18	AM7	Hexagon nut	20 Nm
2 AZ Holder to crankcase	N18	M8		20 Nm



11 62 Exhaust manifold
Tightening Torques

	Type	Thread	Tightening specifications	Torque
1 Exhaust manifold to cylinder head AZ	N18	M8		25 Nm
2 AZ Stud to cylinder head	N18	M8		15 Nm



11 65 Turbocharger and control

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1 Exhaust turbocharger to AZ exhaust manifold	N18	M8 nut		20 Nm
2 AZ Stud bolts to exhaust manifold	N18	M8		15 Nm
3 Holder to exhaust turbocharger AZ	N18	M8		25 Nm
4 Oil feed line to exhaust AZ turbocharger	N18	Banjo bolt M12 x 1.5	Replace all seals	30 Nm
5 Oil return line to exhaust AZ turbocharger	N18	M6 x 18	Replace all seals	8 Nm
6 AZ Holder to crankcase	N18	M8		19 Nm
7 Front heat shield to rear heat AZ shield	N18	M6 x 20		4 Nm
8 AZ Vacuum container	N18	M8		19 Nm
9 Delivery and return coolant lines AZ to exhaust turbocharger	N18	Hollow bolt	Replace all seals	35 Nm



11 78 Emissions control, control sensor / monitoring sensor

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1 - Control sensor LSU 4.9 / AZ monitoring sensor LSU ADV	N18	M 18		50 Nm
2 Bracket, oxygen sensors, and AZ control sensor bracket	N18	M6 x 12		8 Nm



11 operating fluid overview

Testing equipment

Connecting hose
Ä = 8 x 13 mm, length = 70 mm

Sealing compound

Loctite 5970 liquid sealing compound	50 ml, Cartridge	83190404517
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[Overview of consumables \(Electronic Parts Catalogue\)](#)

Expendable materials

Brake cleaner2.0	500 ml, Spray can	83192365214
	20 , Canister	83192365215

Expendable materials

lubricating grease Longtime PD -1	400 g, Cartridge	83192160340
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[Overview of consumables \(Electronic Parts Catalogue\)](#)

Expendable materials

Copper paste	100 g, Tube	81229400794
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[Overview of consumables \(Electronic Parts Catalogue\)](#)

Expendable materials

Lubricating grease SYNTHESO GLEP 1	100 g, Tube	83299407778
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[Overview of consumables \(Electronic Parts Catalogue\)](#)

Engine oil

Technically suitable engine oils for BMW Group engines

[3.0 Technically appropriate engine oils for BMW Group engines](#)

Engine oil

Technically suitable engine oils for BMW Group engines

[3.0 Specified engine oils for Toyota J29](#)

Sealing compound

Sealant Drei Bond 1209	30 ml, Tube	07 58 9 062 376
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12 12 Spark Plugs

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Spark plugs (unlubricated)	W10 / W11	M14 x 1.25		27 Nm
2AZ Spark plugs (unlubricated)	N12 / N14 / N16 / N18	M12 x 1.25		23±3 Nm



12 31 Alternator with drive and mounting parts

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Alternator to crankcase	N12 / N14 / N16 / N18 / W16			20 Nm
2AZ Battery positive lead to alternator	N12 / N14 / N16 / N18 / W16			13.5 Nm



12 41 Starter motor and mounting parts

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Starter motor to transmission	N12 / N14 / N16 / N18 / W16	M8		20 Nm
2AZ Battery positive lead to starter	N12 / N14 / N16 / N18 / W16	M8		14 Nm



12 51 Plug connections, terminals, loose components

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Ground connection for ignition coils	N12 / N14 / N16 / N18	M5		5.5 Nm
2AZ Holder, wiring harness, to crankcase	N12 / N14 / N16 / N18	M5 x 16		5.5 Nm
3AZ Cable duct to crankcase	N12 / N14 / N16 / N18	M6 x 16		8 Nm
4AZ Holder, wiring harness duct	N12 / N14 / N16 / N18	M6 x 16		9 Nm



12 51 Plug connections, terminals, loose components

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Ground connection for ignition coils	N12 / N14 / N16 / N18	M5		5.5 Nm
2AZ Holder, wiring harness, to crankcase	N12 / N14 / N16 / N18	M5 x 16		5.5 Nm
3AZ Cable duct to crankcase	N12 / N14 / N16 / N18	M6 x 16		8 Nm
4AZ Holder, wiring harness duct	N12 / N14 / N16 / N18	M6 x 16		9 Nm



12 61 Display of oil pressure, oil temperature

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Oil pressure switch	N16 / N18	M12		25 Nm



13 51 Injection pump, control, mixture control.

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ High pressure pump	N14	M6 (ISA screw)	Use new screws.	11 ± 1 Nm
	N18	M6 (hexagon screw)	Continental high pressure pump Use new screws.	10 Nm
	N18	M6 Fillister head bolt	Bosch high pressure pump Use new screws.	12 Nm



1351 Overview of tightening torques

High pressure pump	
Renew screws.	10Nm
High pressure pump	
Renew screws.	12Nm



13 53 Fuel injectors and lines

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ High-pressure pipe	N14	M12 x 1	1. Jointing torque	15 Nm
			2. Torque	33 ± 3 Nm
			3 warm-up 5 minutes	
			4. Retighten	33 ± 3 Nm
	N18	M12 x 1	Continental high pressure pump	26 ± 3 Nm
		M14 x 1	Bosch high pressure pump	30 ± 3 Nm
3AZ High-pressure rail to cylinder head	N14 / N18	M8 x 20		19 Nm
4AZ Fuel injection pipe to cylinder head	N12 / N16	M6 x 25		8 Nm
5AZ Retaining clip, high-pressure line	N18	M6 x 25		8 Nm



13 51 Injection pump, control, mixture control.

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ High pressure pump	N14	M6 (ISA screw)	Use new screws.	11 ± 1 Nm
	N18	M6 (hexagon screw)	Continental high pressure pump Use new screws.	10 Nm
	N18	M6 Fillister head bolt	Bosch high pressure pump Use new screws.	12 Nm



1353 Overview of tightening torques

High-pressure pipe	
	26Nm
High-pressure pipe	
Coupling nut	30Nm
Screw for retaining clip	8Nm



13 54 Throttle valve with servodrive

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Throttle valve assembly to intake manifold	N12 / N14 / N16 / N18		Intake manifold, new part	10 ± 1 Nm
			Intake manifold, used	7 Nm



13 62 Hot-film air mass meter

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Hot film air-mass meter to intake filter housing	N14 / N18			4.6 Nm



13 62 Sensors for control unit

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Differential-pressure sensor to intake manifold	N12 / N14	M6 x 18		5 Nm
2AZ Knock sensor	N12 / N14 / N16 / N18	M8 x 125		20 Nm
3AZ Crankshaft sensor	N12 / N14 / N16 / N18	M5 x 30		5 Nm
4AZ Camshaft sensor	N12 / N14 / N16 / N18	M6 x 100		8 Nm
5AZ Suction pressure sensor	N14 / N18	M6 x 18		5 Nm
6AZ Temperature and boost pressure sensor	N14 / N18	M6 x 18		5 Nm



1364 Overview of Technical Data

Cleaning of injectors with the ultrasonic cleaning unit	
	Cleaning temperature
	60 °C
	Cleaning time
	30 min
	Quantity of SPX special cleaner per cleaning cycle
	1000 ml



13 62 Hot-film air mass meter

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Hot film air-mass meter to intake filter housing	N14 / N18			4.6 Nm



13 71 Intake filter housing

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Assembly, intake filter housing	N12 / N16	Self-tapping screw		2.5 Nm
2AZ Intake filter housing to cylinder head cover	N12 / N16			8 ± 2 Nm
3AZ Assembly, intake filter housing	N14 / N18	Self-tapping screw		3 Nm
4AZ Intake filter housing to intake manifold	N14 / N18			6 ± 0.5 Nm
5AZ Hose clamp to sound generator	N14 / N18			3 Nm



1371 Overview of tightening torques

Hose clamp to sound generator



13 operating fluid overview



22 11 Engine mounting

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Engine support bracket to engine mount	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12x1.5 - 10.9 nut		100 Nm
2AZ Engine mounting bracket to adapter plate	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10 8.8 screw		38 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10 10.9 screw		56 Nm
3AZ Adapter plate to engine	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10 8.8 screw		41 Nm
4AZ Engine mount to body	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10 10.9 screw		68 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12 8.8 screw		68 Nm
5AZ Bracket, anti-roll bar link to engine	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10 8.8 screw		38 Nm
6AZ Anti-roll bar link to bracket	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12x90 screw		108 Nm
7AZ Grounding cable to engine support bracket	R55 / R56 / R57 / R58 / R59 / R60 / R61	nut M8		15 Nm
8AZ Adapter plate to engine	R55 / R56 / W16	M10x75 screw		55 Nm
9AZ Anti-roll bar link to front axle carrier	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12x90 screw		108 Nm



16 11 Fuel Tank and Retaining Elements

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Nut/fuel filler pipe to body	R55 / R56 / R57 / R58 / R59 / R60 / R61	M6		6 Nm
2AZ Service cap to body	R55 / R56 / R57 / R58 / R59 / R60 / R61			6 Nm
3AZ Tank to rear axle support and body	R55 / R56 / R57 / R58 / R59 / R60 / R61	M8		19 Nm
4AZ Hose clamp / fuel filling hose	R55 / R56 / R57 / R58 / R59 / R60 / R61			3 Nm
5AZ Clamping band to body	R55 / R56 / R57 / R58 / R59 / R60 / R61	M8		19 Nm



16 14 Fuel pump
Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Lock ring, metal	R55 / R56 / R57 / R58 / R59			45+5 Nm
	R60 / R61			55±5 Nm
2AZ Lock ring, plastic	R55 / R56 / R57 / R58 / R59			85±5 Nm



17 operating fluid overview

Expendable materials

BMW antifreeze and corrosion inhibitor G30-91 DEU	1500 ml, Can	83192211662
	60 l, Barrel	83192304076

Expendable materials

BMW antifreeze and corrosion inhibitor G30-91 Worldwide (except DEU, JPN, CHN, FIN, NOR, SWE, DNK, FRO, AUS)	1500 ml, Can	83512355294
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Expendable materials

BMW antifreeze and corrosion inhibitor G30-91 Worldwide (except DEU)	60 l, Barrel	83512355295
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Expendable materials

BMW antifreeze and corrosion inhibitor G48 DEU	1500 ml, Can	83192211191
	60 l, Barrel	83192304068
	205 l, Barrel	83192304069

Expendable materials

BMW antifreeze and corrosion inhibitor (i01) Worldwide	1 l, Can	83512355296
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Expendable materials

BMW antifreeze and corrosion inhibitor G48 Worldwide (except DEU, JPN, CHN, FIN, NOR, SWE, DNK, FRO, AUS)	1500 ml, Can	83512355290
	60 l, Barrel	83512355291
	205 l, Barrel	83512355293

Expendable materials

BMW antifreeze and corrosion inhibitor G48 FIN, NOR, SWE, DNK, FRO	1500 ml, Can	83192211914
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Expendable materials

BMW antifreeze and corrosion inhibitor G48 JPN	1500 ml, Can	83192211194
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Expendable materials

BMW antifreeze and corrosion inhibitor G48 OFF	1500 ml, Can	83192211913
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Expendable materials



Expendable materials

BMW antifreeze and corrosion inhibitorG48 CHN	1500 ml, Can	83192211195
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Expendable materials

BMW antifreeze and corrosion inhibitor HT-12 Worldwide	5, Canister	83192466484
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Expendable materials

Technically suitable antifreeze and corrosion inhibitor	
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[Main group 17](#)

18 31 Exhaust system, complete

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Catalytic converter to turbocharger	N14 / N18	M8	Initial torque	7 Nm
			Tightening torque	25 Nm
2AZ Stud bolts to turbocharger	N14 / N18	M8		10 Nm
3AZ Catalytic converter to holder	N14 / N18	M8	Replace nuts.	20 ± 5 Nm
4AZ Bracket, catalytic converter, to crankcase	N14 / N18	M8		20 ± 5 Nm
5AZ V-band clamp, exhaust system, to catalytic converter	N12 / N14 / N16 / N18			25 ± 3 Nm
6AZ Clamp	N12 / N14 / N16 / N18			45 Nm
7AZ Exhaust system to transmission	R60 / R61 / N16 / N18	M8		19 Nm
8AZ Exhaust system to stiffening plate	R60 / R61 / N16 / N18	M8		19 Nm
9AZ Reinforcement braces	R60 / R61 / N16 / N18	M14		175 Nm
10AZ Reinforcement plate to body	R60 / R61 / N16 / N18	M8		19 Nm
11AZ Exhaust system to body	N12 / N14 / N16 / N18	M8		21,4 Nm



18 40 Exhaust system, complete

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Exhaust manifold to cylinder head	N12 / N14 / N16 / N18	M8	Replace nuts, coat threads with copper paste.	25 Nm
2AZ Stud to cylinder head	N12 / N14 / N16 / N18	M8		15 Nm
3AZ Catalytic converter to crankcase	N12 / N16	M8		25 Nm
4AZ Heat shield	N12 / N14 / N16 / N18	M6		4 Nm



18 31 Exhaust system, complete

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Catalytic converter to turbocharger	N14 / N18	M8	Initial torque	7 Nm
			Tightening torque	25 Nm
2AZ Stud bolts to turbocharger	N14 / N18	M8		10 Nm
3AZ Catalytic converter to holder	N14 / N18	M8	Replace nuts.	20 ± 5 Nm
4AZ Bracket, catalytic converter, to crankcase	N14 / N18	M8		20 ± 5 Nm
5AZ V-band clamp, exhaust system, to catalytic converter	N12 / N14 / N16 / N18			25 ± 3 Nm
6AZ Clamp	N12 / N14 / N16 / N18			45 Nm
7AZ Exhaust system to transmission	R60 / R61 / N16 / N18	M8		19 Nm
8AZ Exhaust system to stiffening plate	R60 / R61 / N16 / N18	M8		19 Nm
9AZ Reinforcement braces	R60 / R61 / N16 / N18	M14		175 Nm
10AZ Reinforcement plate to body	R60 / R61 / N16 / N18	M8		19 Nm
11AZ Exhaust system to body	N12 / N14 / N16 / N18	M8		21,4 Nm



1831 Overview of tightening torques

Exhaust system to body		
Nut M8		21,4Nm
Exhaust system to stiffening plate		
Bolts M8		19Nm
Exhaust system to transmission		
Bolts M8		19Nm
Reinforcement braces		
Bolts M14		175Nm
Reinforcement plate to body		
Nut M8		19Nm
V-band clamp, exhaust system, to catalytic converter		
V-band clamp		25Nm



18 40 Exhaust system, complete

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Exhaust manifold to cylinder head	N12 / N14 / N16 / N18	M8	Replace nuts, coat threads with copper paste.	25 Nm
2AZ Stud to cylinder head	N12 / N14 / N16 / N18	M8		15 Nm
3AZ Catalytic converter to crankcase	N12 / N16	M8		25 Nm
4AZ Heat shield	N12 / N14 / N16 / N18	M6		4 Nm



18 operating fluid overview

Expendable materials

Diesel particulate filter cleaner	500 ml	83192211602
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Expendable materials

Starter kit for diesel particulate filter cleaner	500 ml	83192211603
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23-1 00 Transmission in general

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Transmission to engine	R50 / R52 / R53	M12		85 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12X1,75		66 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10X1,5		38 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10X1,75		55 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M8		19 Nm
2AZ Screws for cover plate	R50 / R52 / R53	M6		9 Nm
3AZ Reversing light switch	R50			25 Nm



21 21 Clutch disc and drive plate

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Clutch to flywheel	R50	M7	Use NEW screws	20 Nm
2AZ Clutch to flywheel	R53	M8	Use NEW screws	23 Nm
3AZ Clutch to flywheel	R52 / R53	M9	Use NEW screws	28 Nm
4AZ Clutch to flywheel	R55 / R56 / R57 / R58 / R59	M8	Use NEW screws	23 Nm
	R55/R56 Cooper D (W16)	M8	Use NEW screws	20 Nm
5AZ Clutch to flywheel	R55 / R56 / R57 / R58 / R59 D (N47) / R60 / R61	M8	Use NEW screws	23 Nm



2121 Overview of tightening torques

Clutch to flywheel			
Renew screws.			23Nm
Clutch to flywheel			
M8 Renew screws.	Jointing torque		15Nm
	Angle of rotation		90°



21 52 Clutch control (hydraulic)

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Clutch slave cylinder to holder	R50 / R52 / R53	M8		24 Nm
2AZ Clutch slave cylinder to transmission housing	R55 / R56 / R57 / R58 / R59 / R60 / R61	M8		21 Nm
3AZ Clutch master Cylinder to pedal mechanism	R55 / R56 / R57 / R58 / R59 / R60 / R61	M6		9 Nm



22 11 Engine mounting

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Engine support bracket to engine mount	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12x1.5 - 10.9 nut		100 Nm
2AZ Engine mounting bracket to adapter plate	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10 8.8 screw		38 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10 10.9 screw		56 Nm
3AZ Adapter plate to engine	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10 8.8 screw		41 Nm
4AZ Engine mount to body	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10 10.9 screw		68 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12 8.8 screw		68 Nm
5AZ Bracket, anti-roll bar link to engine	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10 8.8 screw		38 Nm
6AZ Anti-roll bar link to bracket	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12x90 screw		108 Nm
7AZ Grounding cable to engine support bracket	R55 / R56 / R57 / R58 / R59 / R60 / R61	nut M8		15 Nm
8AZ Adapter plate to engine	R55 / R56 / W16	M10x75 screw		55 Nm
9AZ Anti-roll bar link to front axle carrier	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12x90 screw		108 Nm



22 32 Transmission mounting

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Transmission mount to transmission	R50 / R52 / R55 / R56 / R57 / R58 / R59 / R60 / R61	M10 8.8		38 Nm
	R53	M12x45 - 8.8		66 Nm
2AZ Transmission support bracket to body	R50 / R52 / R53	M12		68 Nm
	R55 / R56 / R57 / R60 / R61	M10 8.8	Replace with screw M10 10.9	
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10 10.9	Torque	56 Nm
3AZ Transmission support bracket to transmission mount	R50 / R52 / R53 / R60 / R61	M12x1.5x125 - 8.8	Replace nut	68 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12x1.5-10.9 nut	Replace nut Jointing torque Angle of rotation	40 Nm 105 °



23 14 Electrical add-on parts

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Reversing light switch		M12		16 Nm
2AZ Zero-gear sensor to transmission				5 Nm



23-1 00 Transmission in general

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Transmission to engine	R50 / R52 / R53	M12		85 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12X1,75		66 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10X1,5		38 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10X1,75		55 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M8		19 Nm
2AZ Screws for cover plate	R50 / R52 / R53	M6		9 Nm
3AZ Reversing light switch	R50			25 Nm



23 00 Transmission, general

Tightening Torques

Transmission designation	Type	Thread	Tightening specifications	Torque
1AZ Tightening torque, filler / drain plug	GS5-65 BH			35±5 Nm
	GS5-52 BG / GS6-85 BG/DG / BS6--53BG / GS6-55BG / GS6-53BG/DG			43±4 Nm
2AZ Heat shield, manifold	R50 / R52 / R53			8 Nm



23 14 Electrical add-on parts
Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Reversing light switch		M12		16 Nm
2AZ Zero-gear sensor to transmission				5 Nm



23 41 Outer parts, gear shifting

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Switch unit	R55 / R56 / R57 / R58 / R59 / R60 / R61			27 Nm



23-1 00 Transmission in general

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Transmission to engine	R50 / R52 / R53	M12		85 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12X1,75		66 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10X1,5		38 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10X1,75		55 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M8		19 Nm
2AZ Screws for cover plate	R50 / R52 / R53	M6		9 Nm
3AZ Reversing light switch	R50			25 Nm



23 operating fluid overview

Brake fluid and hydraulic fluid

Hydraulic fluid CHF 11 S	1 l, Can	83290429576
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Transmission oil

Manual gearbox oil MTF LT-5	1 l, Can	83222156969
	20 l, Barrel	83222167666

Transmission oil

Manual gearbox oil MTF 3	1 l, Bottle	83222455210
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Transmission oil

Manual gearbox oil MTF LT-2 * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	1 l, Can	83222339219
	5 l, Can	83220309031
	1000 ml, TU*	83220396705

Transmission oil

Manual gearbox oil MTF LT-3 * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	1 l, Can	83222339221
	5 l, Can	83227533818
	1000 ml, TU*	83220396706

Transmission oil

Manual gearbox oil MTF LT-4 * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	1 l, Can	83222339223
	5 l, Can	83220421925
	1000 ml, TU*	83220430275

Transmission oil

Manual gearbox oil MTF 2 * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	1 l, Can	83222344589
	20 l, Barrel	83220403247
	1000 ml, TU*	83220403673

Transmission oil

Manual gearbox oil MTF 1	1 l	83222339224
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Manual gearbox oil MTF 1	1 l, Can	81222339384
* TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	1000 ml, TU*	81229401225

Transmission oil

Technically suitable manual gearbox oil

[Main group 23](#)



24 61 Control unit

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Holder to bulkhead	R55 / R56 / R57 / R58 / R59 / R60 / R61	Hexagon nut with clamping piece		4,5 Nm
2AZ Control unit to bracket	R55 / R56 / R57 / R58 / R59 / R60 / R61			8 Nm



24 11 Transmission Case, Oil Sump

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Drain plug to oil sump/transmission	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10		27 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M18		25 Nm
2AZ Filler plug to transmission housing	R55 / R56 / R57 / R58 / R59 / R60 / R61	M14		25 Nm
3AZ Oil sump to transmission	R55 / R56 / R57 / R58 / R59 / R60 / R61	M6		8 Nm
4AZ Transmission to engine	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12		66 Nm
		M10		38 Nm
		M8		19 Nm
5AZ Gearshift mount on transmission	R55 / R56 / R57 / R58 / R59 / R60 / R61	M8		19 Nm
6AZ Selector lever to shaft	R55 / R56 / R57 / R58 / R59 / R60 / R61	M8		12 Nm
7AZ				
8AZ AISIN shift cable to clamping piece	R55 / R56 / R57 / R58 / R59 / R60 / R61	M8		12 Nm
9AZ AISIN converter, transportation lock	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12 screw		17 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10 nut		7 Nm
10AZ AISIN screw connection Oil strainer	R55 / R56 / R57 / R58 / R59 / R60 / R61	Screw M6		11 Nm
11AZ AISIN screw connection, oil cooler	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12 screw		35 Nm
12AZ AISIN screw connection, gear position switch	R55 / R56 / R57 / R58 / R59 / R60 / R61	Screw M6		5.5 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	M14 nut		7 Nm



17AZ AISIN selector slide and oil temperature sensor	R55 / R56 / R57 / R58 / R59 / R60 / R61	nut M8		10 Nm
18AZ AISIN selector unit	R55 / R56 / R57 / R58 / R59 / R60 / R61	Screw M6	Jointing torque	8 Nm
			Angle of rotation	90 ° ±5 °
19AZ AISIN input speed sensor EGS multiple connector	R55 / R56 / R57 / R58 / R59 / R60 / R61	Screw M6		5 Nm
20AZ AISIN output speed sensor	R55 / R56 / R57 / R58 / R59 / R60 / R61	Screw M6		6 Nm
21AZ AISIN converter to flywheel	R55 / R56 / R57 / R58 / R59 / R60 / R61 / N12 / N14 / N16 / N18 / N47	M10 nut		53 Nm
	R55 / R56 / W16	M10 nut		45 Nm



24 61 Control unit

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Holder to bulkhead	R55 / R56 / R57 / R58 / R59 / R60 / R61	Hexagon nut with clamping piece		4,5 Nm
2AZ Control unit to bracket	R55 / R56 / R57 / R58 / R59 / R60 / R61			8 Nm



24 operating fluid overview

Transmission oil

Automatic transmission fluid ATF D II	1 l, Can	81229400272
	60 l, Barrel	81229400275

Transmission oil

Automatic transmission fluid ATF D VI	1 l, Can	83222167718
	5 l, Barrel	83222167720

Transmission oil

Automatic transmission fluid ATF 1	1 l, Can	83222305395
	5 l, Can	83222344588

Transmission oil

Automatic transmission fluid ATF 4	1 l, Bottle	83222344206
	20 l, Barrel	83229407807

Transmission oil

Automatic transmission fluid ATF 5	1 l, Bottle	83222344207
	20 l, Barrel	83220442817

Transmission oil

Automatic transmission fluid ATF 6	1 l, Bottle	83222355599
	20 l, Barrel	83222355601

Transmission oil

Automatic transmission fluid JWS 3309	1 l, Bottle	83227542290
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Transmission oil

Automatic transmission fluid ATF 3+	1 l, Bottle	83222289720
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Transmission oil

Automatic transmission fluid ATF 33 * TU = Trade Unit. TU numbers cannot be ordered!	20 l, Barrel	83220403580
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For invoicing purposes only.	1000 ml, TU*	83220406574
Transmission oil		
Automatic transmission fluid ATF D III * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	1 l, Can	83229407858
	1000 ml, TU*	83229407860
Transmission oil		
Automatic transmission fluid ATF 2 * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	1 l, Can	83222305396
	20 l, Barrel	83220142516
	1000 ml, TU*	83220144137



25 16 Switch block - automatic transmission

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Bracket, cable, to body	R55 / R56 / R57 / R58 / R59 / R60 / R61	M6		8 Nm
2AZ Shift housing to body	R55 / R56 / R57 / R58 / R59 / R60 / R61			8 Nm



26 11 Propeller Shaft. complete

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Propeller shaft plugged into transfer box PTO (insert nut)	R60 ALL		Torque	75 Nm
2AZ Rear flexible disc to rear axle final drive	R60 ALL		Replace screws Jointing torque and angle of rotation must be observed without fail	
			Jointing torque Angle of rotation	25 Nm 60° + 10°
3AZ Flexible disc, rear, to propeller shaft	R60 ALL		Replace bolts and nuts Jointing torque and angle of rotation must be observed without fail	
			Jointing torque Angle of rotation	43 Nm 60°
4AZ Centre mount to body	R60 ALL			21 Nm
5AZ Front propeller shaft to rear propeller shaft	R60 ALL			60 Nm



26 operating fluid overview

Expendable materials

Lubricating grease Optitemp HT 1 LF	50 g, Tube	83230417754
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Expendable materials

Lubricating grease Olistamoly 2 LN 584 LO	100 g, Tube	83 19 0 447 919
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27 10 Transfer Box in General

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Transfer box PTO to transmission	R60 ALL / R61 ALL	M12		93 Nm
2AZ Transfer box holder to transfer box and anti-roll bar link holder	R60 ALL / R61 ALL	M10		56 Nm
3AZ Oil filler plug	R60 ALL / R61 ALL	M 18x1.5		34 Nm



27 10 Transfer Box in General

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Transfer box PTO to transmission	R60 ALL / R61 ALL	M12		93 Nm
2AZ Transfer box holder to transfer box and anti-roll bar link holder	R60 ALL / R61 ALL	M10		56 Nm
3AZ Oil filler plug	R60 ALL / R61 ALL	M 18x1.5		34 Nm



27 operating fluid overview

Transmission oil

Transfer box oil DTF 1	1 l, Bottle	83222409710
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Transmission oil

Hypoid Axle Oil G1	3x 500 ml, Bottle	83222295532
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Expendable materials

Mounting grease GE	5 g, Tube	83232357146
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Transmission oil

Technically suitable transfer box and electrical transmission oils	
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[Main group 27](#)

Expendable materials

Solvent cleaner GE * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	300 ml, Can	83232357553
	50 ml, TU*	83232288661



28 operating fluid overview

Transmission oil

Double-clutch transmission oil DCTF-1+	1 l, Bottle	83222446673
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Expendable materials

Twin-clutch gearbox oil BMW DCTF-2	1 , Bottle	83 22 2 433 157
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31 11 Front axle support

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Front axle support, middle, to body	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12		100 Nm
2AZ Rear end of front axle support to body	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12		100 Nm
3AZ Holder, front bumper, to front axle support	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12		100 Nm
4AZ Holder, wishbone rubber mount, to front axle support	R55 / R56 / R57 / R58 / R59 / R60 / R61	M14		165 Nm
5AZ Holder, wishbone rubber mount, to body	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10	Replace screws. Jointing torque Angle of rotation	59 Nm 90 °
6AZ Strut front/rear on front axle support	R60 / R61	M14		175 Nm



31 12 Axle guide and axle strut

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Wheel control joint to wishbone	R55 / R56 / R57 / R58 / R59	M14	Replace nuts.	175 Nm
	R60 / R61	M14	Replace nuts. Jointing torque Angle of rotation	50 Nm 90 째
2AZ Wheel guide joint to swivel bearing	R55 / R56 / R57 / R58 / R59	M12	Renew nut. Jointing torque Angle of rotation	70 Nm 90 째
	R60 / R61	M10	Renew screw.	60 Nm
3AZ Ball joint, inner, to front axle support	R55 / R56 / R57 / R58 / R59 / R60 / R61	M14	Renew nut. Jointing torque Angle of rotation	80 Nm 90 째
4AZ Holder, wishbone rubber mount, to front axle support	R55 / R56 / R57 / R58 / R59 / R60 / R61	M14	Renew screws.	165 Nm
5AZ Holder, wishbone rubber mount, to body	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10	Renew screw. Jointing torque Angle of rotation	59 Nm 90 째



31 21 Wheel Bearings and Steering Knuckle

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Wheel bearing to swivel bearing	R55 / R56 / R57 / R58 / R59	M10	Replace screws. Jointing torque Angle of rotation	20 Nm 90 °
	R60 / R61	M12	Replace screws. Tighten crosswise. Jointing torque Final torque	30 Nm 120 Nm



31 31 Spring Struts

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Spring strut support bearing to body	R55 / R56 / R57 / R58 / R59 / R60 / R61	M8	Replace nuts.	34 Nm
2AZ Spring strut support bearing to spring strut shock absorber	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12	Replace nut.	64 Nm
3AZ Spring strut shock absorber to swivel bearing	R55 / R56 / R57 / R58 / R59	M12	Replace screw and nut. Tighten only via screw!	100 Nm
	R60 / R61	M12	Replace screw and nut. Tighten via nut!	100 Nm



31 35 Anti-roll bar

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Anti-roll bar link to anti-roll bar	R55 / R56 / R57 / R58 / R59	M10	Replace nut.	56 Nm
	R60 / R61	M10	Replace nut.	60 Nm
2AZ Anti-roll bar link to spring strut shock absorber	R55 / R56 / R57 / R58 / R59	M10	Replace nut.	56 Nm
	R60 / R61	M10	Replace nut.	60 Nm
3AZ Holder, wishbone rubber mount, to front axle support	R55 / R56 / R57 / R58 / R59 / R60 / R61	M14		165 Nm



31 60 Output shaft

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Output shaft bearing to engine block	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10		38 Nm
2AZ Output shaft to angular-contact ball bearing	R55 / R56 / R57 / R58 / R59 / R60 / R61	M22	Replace collar nut, lightly oil contact surface.	250 Nm



31 operating fluid overview

Transmission oil

Technically suitable front axle transmission oils

[Main group 31](#)



32 00 Steering

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Steering box to front axle carrier	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12		100 Nm
2AZ EPS unit to steering box	R55 / R56 / R57 / R58 / R59 / R60 / R61			24 Nm



32 21 Drop Arm

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Track rod end to swivel bearing	R55 / R56 / R57 / R58 / R59	M12	Replace nut	65 Nm
	R60 / R61		Jointing torque Angle of rotation Replace nut	30 Nm 90 °
2AZ Track rod end to track rod	R55 / R56 / R57 / R58 / R59 / R60 / R61			30 Nm
3AZ Track rod to steering box	R55 / R56 / R57 / R58 / R59 / R60 / R61			76,5 Nm



3221 Overview of Technical Data

Ear hose clamp gap dimension	
Dimension [A]	max. 1 mm



32 31 Steering Column

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Lower steering column shroud to steering column	R56 / R55 / R57 / R58 / R59 / R60 / R61			4 Nm
2AZ Lower steering shaft to steering box	R56 / R55 / R57 / R58 / R59		Clean thread and remove remains of screw locking Replace screw	28 Nm
	R60 / R61		Clean thread and remove remains of screw locking Replace screw Jointing torque Angle of rotation	25 Nm 90 °
3AZ Steering column to cross member	R55 / R56 / R57 / R58 / R59			35 Nm
	R60 / R61			24 Nm



32 33 Steering Wheel

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Steering wheel to steering column	R55 / R56 / R57 / R58 / R59 / R60 / R61	M14		62,5 Nm
2AZ Mounting plate, airbag to steering wheel	R55 / R56 / R57 / R58 / R59 / R60 / R61			6 Nm



32 operating fluid overview

Expendable materials

Lubricating grease FB-1	100 g, Tube	83 23 2 208 093
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33 10 Rear axle final drive
Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Clutch to rear axle final drive	R60ALL	M10		75 Nm



33 11 Rear axle gearbox housing with lid

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Screw plug with O-ring	R60ALL	M22	Replace screw plug.	60 Nm



33 17 Rear axle final drive suspension

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Rear axle final drive to rear axle support	R60 / R61	M12		100 Nm
2AZ Rear axle final drive to cross member	R60 / R61	M10	Renew screws. Jointing torque and angle of rotation must be observed without fail. Tightening torque Angle of rotation	 56 Nm 90 °



33 31 Rear axle support

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Rear axle carrier to body	R60 / R61	M12		100 Nm
2AZ Cross member to body	R60 / R61	M12		100 Nm
3AZ Cross member to rear axle final drive	R60 / R61	M10	Replace screws. Jointing torque and angle of rotation must be observed without fail. Jointing torque Angle of rotation	56 Nm 90 °
4AZ Longitudinal strut to rear axle support/body	R60 / R61	M10		65 Nm
5AZ Vibration absorber (65HZ) to cross member	R60 / R61	M10		60 Nm



3331 Overview of tightening torques

Longitudinal struts to rear axle support/body

Bolts M10	65Nm
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33 32 Axle guide and axle strut

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Upper wishbone to trailing arm	R60 / R61	M12	Replace nut. Tighten in normal position.	108 Nm
2AZ Lower wishbone to trailing arm	R60 / R61	M12	Bolt tightening sequence must be observed without fail. Tighten in normal position. Initial torque Release by Final torque	50 Nm 120 ° 108 Nm
3AZ Wishbone to rear axle support	R60 / R61	M12	Replace nut. Tighten in normal position.	100 Nm
4AZ Holder, trailing arm to trailing arm	R60 / R61	M14	Jointing torque and angle of rotation must be observed without fail. Tighten in normal position. Jointing torque Angle of rotation	140 Nm 90 °
5AZ Trailing arm holder to body	R60 / R61	M12		108 Nm



33 41 Wheel Bearings

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Wheel bearing to trailing arm	R60 / R61	M12	Tighten crosswise.	100 Nm
2AZ Output shaft to wheel bearing	R60ALL / R61ALL	M22	Replace collar nut, lightly oil contact surface.	182 Nm



33 52 Shock Absorbers

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Spring strut shock absorber to trailing arm	R60 / R61 / R60ALL / R61ALL	M14 x 110	Jointing torque and angle of rotation must be observed without fail. Replace screw. Jointing torque Angle of rotation	140 Nm 90 °
2AZ Spring strut support bearing to body	R60 / R61 / R60ALL / R61ALL	M10	Replace screws.	56 Nm
3AZ Spring strut support bearing to spring strut shock absorber	R60 / R61 / R60ALL / R61ALL	M10	Replace nut.	30 Nm



33 55 Anti-roll bar

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Anti-roll bar link to anti-roll bar	R60 / R61	M10	Replace nut	60 Nm
2AZ Anti-roll bar link to trailing arm	R60 / R61	M10	Replace nut	60 Nm
3AZ Retaining bracket, anti-roll bar to rear axle support	R60 / R61	M8		21 Nm



33 operating fluid overview

Transmission oil

Hypoid Axle Oil G4	500 ml, Bottle	83222447362
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Transmission oil

Hypoid Axle Oil G3	500 ml, Bottle	83222413512
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Transmission oil

Rear axle differential oil SAF-XJ Booster	3x 1 l, Bottle	83222282583
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Transmission oil

Rear axle differential oil SAF Carbon Mod	500 ml, Bottle	83120445832
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Transmission oil

Hypoid Axle Oil G2	500 ml, Bottle	83222413511
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Transmission oil

Technically suitable rear axle differential oils		
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[Main group 33](#)

Transmission oil

BMW Synthetics OSP	1 l, Bottle	83222365987
	60 l, Barrel	83229407768

Transmission oil

BMW HOC oil	850 ml, Bottle	83222413513
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Transmission oil

Rear axle differential oil MSP/A * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	1 l, Bottle	83222365988
	1000 ml, TU*	83229405462



34 00 Testing and bleeding brakes

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Vent valve Floating caliper	R55 / R56 / R57 / R58 / R59 / R60 / R61			9 - 11 Nm
1AZ Vent valve Fixed caliper, sport brake	R55 / R56 / R57 / R58 / R59 / R60 / R61			17-20 Nm



34 11 Front Brake

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Brake disc to wheel hub (contact faces between brake disc and wheel hub clean and grease-free)	R55 / R56 / R57 / R58 / R59	Torx screw M10 x 13	Replace screws	27 Nm
	R60 / R61	Hexagon socket screw M 8x14	Replace screws	16 Nm
2AZ Brake caliper to steering knuckle	R55 / R56 / R57 / R58 / R59 / R60 / R61	M12	Replace self-locking or microencapsulated screws	110 Nm
	R56 GP II	M12	Replace screws. The new microencapsulated screws must tightened to the prescribed tightening torque within 5 minutes of being screwed in. Jointing torque Angle of rotation	50 Nm 90 °
3AZ Guide screws (hexagon screw)	R55 / R56 / R57 / R58 / R59 / R60 / R61	WAF 13	Replace self-locking or microencapsulated screws	35 Nm
4AZ Protective plate to steering knuckle	R55 / R56 / R57 / R58 / R59	M6 x 10	Replace self-locking or microencapsulated screws	8 Nm
	R60 / R61	M6 x 12	Replace self-locking or microencapsulated screws	12 Nm



34 21 Rear Brake

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Brake disc to wheel hub (contact faces between brake disc and wheel hub clean and grease-free)	R55 / R56 / R57 / R58 / R59	Torx screw M10 x 13	Replace screws	27 Nm
	R60 / R61	M8 x 14	Replace screws	16 Nm
2AZ Brake caliper to wheel carrier	R55 / R56 / R57 / R58 / R59	M10	Replace self-locking or microencapsulated screws	65 Nm
	R60 / R61	M12 x 30	Replace self-locking or microencapsulated screws	100 Nm
3AZ Guide screws (hexagon screw)	R55 / R56 / R57 / R58 / R59 / R60 / R61	WAF 13	Replace self-locking or microencapsulated screws	35 Nm
4AZ Brake guard plate, rear, to trailing arm	R60 / R61	M6 x 12	Replace self-locking or microencapsulated screws	12 Nm



34 31 Master Brake Cylinder

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Brake master cylinder to brake booster	R55 / R56 / R57 / R58 / R59 / R60 / R61		Replace self-locking nuts	23 Nm
2AZ Expansion tank to brake master cylinder	R55 / R56 / R57 / R58 / R59 / R60 / R61			8 Nm



34 32 Brake Lines

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Brake line screw connections	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10 x 1 M12 x 1		14 Nm
	R55 / R56 / R57 / R58 / R59	M10 x 1 M12 x 1	Blue retaining screw	17 Nm
2AZ Brake hose to brake caliper, front	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10		24 Nm
3AZ Brake hose to brake caliper, rear	R55 / R56 / R57 / R58 / R59 / R60 / R61	M10		24 Nm



34 33 Brake servo
Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Bearing pedestal to brake assembly and body	R55 / R56 / R57 / R58 / R59 / R60 / R61		Replace self-locking nuts	21 Nm



34 41 Parking brake

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Handbrake lever to body	R55 / R56 / R57 / R58 / R59	M8		22± 3 Nm
	R60 / R61	M8		19 Nm
2AZ Holder, parking brake Bowden cable, to rear axle support	R55 / R56 / R57 / R58 / R59 / R60 / R61	M6		9± 1 Nm



34 51 Traction Control System (ABS, ASC+T, DSC)

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Control unit on hydraulic unit	R55 / R56 / R57 / R58 / R59 / R60 / R61			5 Nm
2AZ Hydraulic unit to bracket	R55 / R56 / R57 / R58 / R59 / R60 / R61			8 Nm
3AZ Bracket to body	R55 / R56 / R57 / R58 / R59 / R60 / R61			24 Nm
4AZ Pulse sensor, front and rear, to steering stub / side member	R55 / R56 / R57 / R58 / R59 / R60 / R61			8 Nm
5AZ DSC sensor to holder	R55 / R56 / R57 / R58 / R59 / R60 / R61	M6		9 Nm
6AZ Bracket, DSC sensor, to body	R55 / R56 / R57 / R58 / R59 / R60 / R61	M6		9 Nm
7AZ ASC/DSC control unit to hydraulic unit	R55 / R56 / R57 / R59 / R58	M4	Replace screws Tighten in crosswise sequence Level 1 Level 2	1 Nm 3 Nm



34 51 Traction Control System (ABS, ASC+T, DSC)

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Control unit on hydraulic unit	R55 / R56 / R57 / R58 / R59 / R60 / R61			5 Nm
2AZ Hydraulic unit to bracket	R55 / R56 / R57 / R58 / R59 / R60 / R61			8 Nm
3AZ Bracket to body	R55 / R56 / R57 / R58 / R59 / R60 / R61			24 Nm
4AZ Pulse sensor, front and rear, to steering stub / side member	R55 / R56 / R57 / R58 / R59 / R60 / R61			8 Nm
5AZ DSC sensor to holder	R55 / R56 / R57 / R58 / R59 / R60 / R61	M6		9 Nm
6AZ Bracket, DSC sensor, to body	R55 / R56 / R57 / R58 / R59 / R60 / R61	M6		9 Nm
7AZ ASC/DSC control unit to hydraulic unit	R55 / R56 / R57 / R59 / R58	M4	Replace screws Tighten in crosswise sequence Level 1 Level 2	1 Nm 3 Nm



34 operating fluid overview

Expendable materials

Lubricating grease Staburags NBU 12K	100 g, Tube	83 23 9 407 810
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Expendable materials

Safety cleaner 2.0	500 ml, Spray can	83192362037
	20 l, Canister	83192362038
	60 l, Canister	83192362040

Expendable materials

Brake block paste * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	3 g, Bag	83192158851
	100 g, Tube	83192158852
	5 g, TU*	83230140233

Brake fluid and hydraulic fluid

Brake fluid DOT4, low viscosity OFF	500 ml, Can	83130042718
	30 , Barrel	83130430440

Brake fluid and hydraulic fluid

Brake fluid DOT4, low viscosity CHN	1 , Can	83132406162
	1 , Can	83132467487

Brake fluid and hydraulic fluid

Brake fluid DOT4 front left, low viscosity * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only. EU	250 ml, Can	83132405975
	500 ml, Can	83132405976
	1 l, Can	83132405977
	5 l, Can	83132405978
	30 l, Barrel	83130443028
	60 l, Barrel	83130443029
	1000 ml, TU*	83132184842
	1000 ml, TU*	83132184843



	1000 ml, TU*	83130443030
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35 11 Pedal Assembly Console
Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Bearing block to body	R55 / R56 / R57 / R58 / R59 / R60 / R61	M8	Replace self-locking nuts	21 Nm



35 40 Accelerator pedal activation

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Accelerator pedal module to body	R55 / R56 / R57 / R58 / R59 / R60 / R61			8 Nm



35 40 Accelerator pedal activation

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Accelerator pedal module to body	R55 / R56 / R57 / R58 / R59 / R60 / R61			8 Nm



36 10 Wheels

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Wheel bolts	R55 / R56 / R57 / R58 / R59 / R60 / R61	M14 / 17 A/F	<ul style="list-style-type: none">- Screw in the wheel bolts and evenly tighten by hand in a crosswise sequence in order to centre the wheel rim.- Tighten the wheel bolts to the specified tightening torque in a crosswise sequence using a calibrated torque wrench.- Check all wheel bolts in the same sequence and retighten to the prescribed tightening torque if necessary.	140 ± 10 Nm



36 11 Wheel Rims

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Valve on disc wheel (Tyre Pressure Monitor)	R52 / R55 / R56 / R57 / R58 / R60			3.5 Nm
2AZ Wheel electronics (Tyre Pressure Monitor) on valve	R52 / R55 / R56 / R57 / R58 / R60			3.5 Nm



36 operating fluid overview

Expendable materials

Tyre-fitting paste	3500 g, Bucket	81220433046
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Expendable materials

Lubricating spray	400 ml, Spray can	83192156562
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37 14 Electric components

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Ride height sensor to holder	R55 / R56 / R57 / R58 / R59	M5		4.4 Nm
	R60	M5		4.6 Nm
2AZ Ride height sensor holder to front axle support	R55 / R56 / R57 / R58 / R59 / R60	M6		7.6 Nm
3AZ Ride height sensor holder to rear axle support	R55 / R56 / R57 / R58 / R59 / R60	M6		7.6 Nm
4AZ Jointed rod to ride height sensor/holder	R55 / R56 / R57 / R58 / R59	M6	Replace nut.	7.2 Nm
	R60	M6	Replace nut.	7.6 Nm
5AZ Holder to wishbone	R55 / R56 / R57 / R58 / R59	M6		6 Nm
	R60	M6		8 Nm



41 14 Reinforcement plate
Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Cap nut to reinforcement plate	All	M5		6 Nm



41 33 Front-end module (MFE)

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Horn on MFE	R50/R53			8 Nm
2AZ Fog light on MFE	R50/R53			1.5 Nm
3AZ Bumper adjusting fixture to MFE	R50/R53			6 Nm
4AZ Lock bridge on front panel	R56 / R55 / R57 / R58 / R60 / R59			8 Nm



41 14 Reinforcement plate
Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Cap nut to reinforcement plate	All	M5		6 Nm



41 35 Side Panels

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Front side wall to body	R56 / R55 / R57 / R58 / R59	M6		13 Nm
2AZ Side wall to body	R60 / R61	M6		8 Nm



41 51 Front doors

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Hinge	R50 / R52 / R53 / R55 / R56 / R57 / R58 / R59	M6		10 Nm
1AZ Hinge bolt	R60 / R61	M10 x 1.25		25 Nm
2AZ Door to door hinge	R50 / R52 / R53	nut M8		20 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61	nut M8		18.5 Nm
3AZ Door plug connection to body	R55 / R56 / R57 / R58 / R59 / R60 / R61	M5 x 16		3 Nm



41 61 Engine compartment lid

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Engine compartment lid to engine compartment lid hinge	R50 / R52 / R53	M8 8.8		18.5 Nm
	R56 / R55 / R57 / R59 / R58	M8 10.9		22 Nm
	R60 / R61	M8 nut		19 Nm
2AZ Engine compartment lid hinge to body	R50 / R52 / R53	M8 8.8		18.5 Nm
	R56 / R55 / R57 / R58 / R59 / R60 / R61	M8 10.9		22 Nm



41 62 Rear lid

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Tailgate to tailgate hinge	R50 / R53	M6x22		10 Nm
	R52	M8x15		18.5 Nm
	R56 / R58	nut M8		18.5 Nm
	R57	M8x30		19 Nm
	R60 / R59 / R61	M8x22		19 Nm
2AZ Tailgate hinge to body	R50 / R53	M8x20 10.9		20 Nm
	R52	M8x17		18.5 Nm
	R56 / R58	nut M8		22 Nm
	R57	M8x12		20 Nm
	R60 / R61	M10 nut		30 Nm
	R59	M8x21		19 Nm
3AZ Tailgate hinge to body	R57	nut M8		19 Nm
4AZ Ground connection	R59	nutM6		6 Nm



41 operating fluid overview

Adhesive

Body adhesive K1	195 ml	83190413015
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Adhesive

Body adhesive K2	2x290 ml	83192355849
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Expendable materials

Cavity preservation	1000 ml	83422457338
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Expendable materials

Thin-wall threaded insert M6		41002288195
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Expendable materials

Thin-wall threaded insert M8		41002361595
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Expendable materials

Helicoil thread insert	M12x30 mm	31 10 6 868 499
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Adhesive

Body adhesive K3	2x300 ml	83190417144
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Expendable materials

Betawipe 4800	10 ml	83192357707
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Expendable materials

Bonding base VP 206	30 ml	83199407777
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Expendable materials

Two-component metal filler plus	100+10 g	83192288329
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Expendable materials

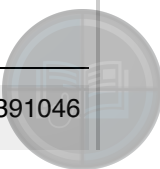
Blind rivet N8	∅6,5 mm, Clamping area 6.8-8.8 mm	83192355998
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Expendable materials

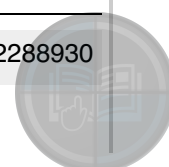
Blind rivet N11 for CFRP connections	∅4,8 mm, Clamping area 2.2-4.7 mm	83197391057
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Expendable materials

Blind rivet N12 for CFRP connections	∅4,8 mm, Clamping area	83197391046
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	4.5-7.5 mm	
Expendable materials		
Plastic nut	∅18 mm	51161943122
Expendable materials		
Plastic nut	∅22 mm	07147169847
Expendable materials		
Cavity sealant spray	400 ml	83422457337
Expendable materials		
Twist drill, high-strength	∅6,8 mm, Length: 79 mm	83192359262
Expendable materials		
Twist drill, high-strength	∅4,2 mm, Length: 66 mm	83192359263
Expendable materials		
ScotchBrite Multiflex A, very fine		51910402967
Expendable materials		
Adhesive tape		51717901759
Expendable materials		
Reinforcement plate, universal		41217275563
Expendable materials		
Sealant D1 (seam sealing)	310 ml	83422409985
Expendable materials		
Sealant D2 (seam sealing, spreadable)	310 ml	83422409986
Expendable materials		
Cavity foamHS1	400 ml	83429410694
Expendable materials		
Structural foamHS2	420 ml	83190007361
Expendable materials		
Cavity foam HS3 (2K polyurethane foam)	50 ml	83422288930
Expendable materials		



Aluminium adhesive tape (adhesive tape)	50 mm	11007769948
Expendable materials		
Repair rivet for T-bolt	∅2,4 mm, Clamping area 0.8-2.5 mm	07148497787
Expendable materials		
Repair rivet for T-bolt	∅2,4 mm, Clamping area 2.5-6.0 mm	07148497788
Expendable materials		
PrimerP2	50 ml, Gas cartridge	83190302555
Expendable materials		
PrimerP1	50 ml, Bottle	83190302556
Expendable materials		
Cavity sealing wax remover	500 ml, Spray bottle	83120390086
Expendable materials		
Screw EMC screw, SF Plus, M5x15		83190301639
Expendable materials		
Drill bit	∅6,8 mm, Length: 150 mm	83192460425
Expendable materials		
Drill bit	∅4,2 mm, Length: 120 mm	83192460424
Expendable materials		
Blind rivet N1 Ø 6.5 mm ; clamping area 2.8-4.8 mm		83190301414
Expendable materials		
Blind rivet N2 Ø 6.5 mm ; clamping area 4.8-6.8 mm		83190301419
Expendable materials		
Punch rivet N5 Ø 5 mm ; 5 mm long		83192158079



Expendable materials

Blind rivet N7 Ø 6.5 mm ; clamping area 1.5 - 3.5 mm		83192240352
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Expendable materials

Blind rivet N10 Dia. 6.5 mm; clamping area 10.8-12.8 mm		83199144282
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Expendable materials

Blind rivet N9 Dia. 6.5 mm; clamping area 8.8-10.8 mm		83197239634
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Adhesive

Body adhesive K5	50 ml	83192158654
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Expendable materials

Blind rivet N3 Dia. 4 mm; clamping area 1-3 mm		83190301421
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Expendable materials

Blind rivet N6 Dia. 4 mm; clamping area 3-5 mm		83192158655
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Adhesive

Aktivator -205	250 ml, Bottle	83190030155
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Adhesive

Body adhesive K5	195 ml	83192157298
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Adhesive

Body adhesive K4	50 ml, Cartridge	83192456697
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Expendable materials

Punch rivet N4 Ø 3 mm ; 4 mm long		83192457307
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51 11 Front bumper

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Bottom bumper spoiler to front panel	R50 / R52 / R53	M6		6 Nm
2AZ Bumper to front panel	R50 / R52 / R53	M6		6 Nm
3AZ Support to body	R50 / R52 / R53 / R55 / R56 / R58 / R59	M8	Nut	22 Nm
	R60 / R61	M10	Nut	45 Nm
4AZ Support to holder, bumper, front	R52 / R53 / R50	M8x20	Screw	22 Nm
	R55 / R56 / R58 / R59	M8		18,5 Nm
	R60 / R61	M8x20		24 Nm
5AZ Adjusting fixture to front panel	R50 / R52 / R53	M6x20		6 Nm
6AZ Adjusting fixture to bumper	R50 / R52 / R53	M6x20		6 Nm
7AZ Lock bridge to body	R55 / R56 / R58 / R59 / R60 / R61			22 Nm
8AZ Support to front panel	R60 / R61			4 Nm
9AZ Strut to front panel	R60 / R61	M6		8 Nm



51 12 Rear bumper

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Support to body	R50 / R52 / R53	M8x25		12,5 Nm
	R55 / R56 / R57 / R58 / R59			21 Nm
	R60 / R61	Nut		65 Nm
2AZ Bracket, side bumper	R60 / R61	Screw		2 Nm
3AZ Centre bumper holder	R60 / R61	Screw		2 Nm



51 77 Cover, sill / wheel arch
Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Cover (wheel arch) to rear door	R60			2 Nm



51 13 Trim Parts, Covers, Handle Strip

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Roof trim strip to roof	R50 / R53 / R55 / R56			1,5 Nm
2AZ Retaining clip of roof trim strip to roof	R50 / R53			1,5 Nm
3AZ Spoiler to tailgate	R50 / R53	M6		8,5 Nm
4AZ Outer C-pillar trim to body	R55	M6 x 13		4,0 Nm
5AZ Roof rails to roof	R55 / R60 / R61	M6		9 Nm
6AZ Front grille to front panel.	R60 / R61			3,5 Nm



51 16 Mirrors, Finishers, Ashtrays, Consoles

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Bracket, handbrake console, to tunnel	R50 / R52 / R53	M6		2,5 Nm
2AZ Front centre console to instrument panel cover trim	R50 / R52 / R53			2,5 Nm
3AZ Mirror to front door	R50 / R52 / R53 / R55 / R56 / R57 / R58 / R59 / R60 / R61	M6x65		8 Nm
4AZ Mounting, front centre console, to body (nuts)	R50 / R52 / R53			2,6 Nm
5AZ Centre armrest to bracket	R50 / R52 / R53			4,5 Nm
	R60 / R61			5 Nm
6AZ Cover, centre console (rear)	R60 / R61			1,5 Nm
7AZ Centre console to retaining bracket	R60 / R61	M6		4 Nm
8AZ Cup holder/end panel	R60 / R61			1,5 Nm
9AZ Rail to retaining bracket	R60 / R61			5 Nm
10AZ Retaining bracket for rail to retaining bracket, rear	R60 / R61			5 Nm



51 21 Front Door Locks

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Outside handle to front door	R50 / R52 / R53 / R55 / R56 / R57 / R58 / R59			4 Nm
	R60 / R61		Sheet metal screw	3.5 Nm
2AZ Door lock pin to body	R50 / R52 / R53			10 Nm
	R55 / R56 / R57 / R58 / R59			19 Nm
3AZ Door lock cylinder to front door	R50 / R52 / R53			6 Nm
	R55 / R56 / R57 / R58 / R59			9 Nm
4AZ Door lock to front door	R50 / R52 / R53 / R55 / R56 / R57 / R58 / R59			6 Nm
	R60 / R61			10 Nm
5AZ Door locking lever to door lock	R50 / R52 / R53 / R55 / R56 / R57 / R58 / R59			3 Nm
6AZ Door retainer to A-pillar	R50 / R52 / R53 / R55 / R56 / R57 / R58 / R59			23 Nm
	R60 / R61			28 Nm
7AZ Door retainer to door	R50 / R52 / R53 / R55 / R56 / R57 / R58 / R59			10 Nm
	R60 / R61			7.6 Nm
8AZ Striker to body	R60 / R61			21 Nm



51 22 Door locks, rear

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Upper striker to body	R55			24 Nm
2AZ Lower striker to rear door	R55			24 Nm
3AZ Door lock to rear door	R55 / F54 / F55 / F60			9 Nm
	R60			10 Nm
4AZ Door retainer to B-pillar	R55 / R60			23 Nm
	F54 / F55			22 Nm
	F60			28 Nm
5AZ Door retainer to door	R55 / R60			10 Nm
	F54 / F55 / F60			11,8 Nm
6AZ Inner door opener to body	R55			1,8 Nm
7AZ Striker to body	R60			18,5 Nm
	F54 / F55 / F60			21 Nm
8AZ Outer door handle to door	R60		Self-tapping screw	3,5 Nm
	F54 / F55 / F60			3,0 Nm



51 23 Engine compartment lid catch/locks

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Catches to side member	R50 / R52 / R53			10 Nm
2AZ Retaining hook to hood/bonnet	R55 / R56 / R57 / R58 / R59			8 Nm
	R60 / R61			10 Nm
3AZ Locks to front panel	R55 / R56 / R57 / R58 / R59 / R60 / R61			10 Nm



51 24 Tailgate locks

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Lock to body	R50 / R53 / R56 / R58 / R59			9 Nm
	R60 / R61			19 Nm
2AZ Lock pin to tailgate	R50 / R53 / R56 / R58 / R59			9 Nm
	R60 / R61	M8		28 Nm
3AZ Lock to tailgate	R52			7,6 Nm
	R57	M6		10 Nm
4AZ Bowden cable, retractor, to body	R52			18,5 Nm
5AZ Bowden cable, retractor, to tailgate	R52			7,6 Nm
6AZ Retractor to tailgate	R52			7,6 Nm
7AZ Lock to splitdoor	R57			8,0 Nm
	R55	M6		9 Nm
8AZ Striker to splitdoor	R55	M6		19 Nm
9AZ Outside door handle to splitdoor	R55	M6		5 Nm
10AZ Holder for trim to splitdoor	R55	M6		9 Nm
11AZ Striker to body	R57			20 Nm
12AZ Tailgate lock (drive)	R57			8.5 Nm
13AZ Button on tailgate	R60 / R61	M5		4.6 Nm
14AZ Ball stud to body / split door (gas pressure spring)	R55			18,5 Nm
15AZ Rubber buffer on tailgate; Counter support on body	R58 / R59	M5		4.6 Nm



51 33 Power windows, front

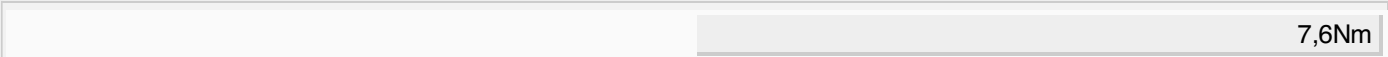
Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Window regulator to inner door panel	R50 / R52 / R53			3 Nm
	R60 / R61			7,6 Nm
2AZ Window lift rail to door (top)	R50 / R52 / R53	M6 x 10		7 Nm
3AZ Window lift rail to door (bottom)	R50 / R52 / R53	M6 x 20		7 Nm
4AZ Rubber window seal to mirror triangle	R60 / R61	M4 x 14		2,5 Nm
5AZ Cover on window frame	R60 / R61			2,5 Nm



5133 Overview of tightening torques

Power window regulator to inner door panel



51 35 Power windows, rear

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Window frame shade	R60 / F54 / F60			2,5 Nm
2AZ Rubber window seal to window frame	R60			2,5 Nm
3AZ Window guide rail to inner door panel	R60			7,6 Nm
4AZ Power window regulator to inner door panel	R60			7,6 Nm
5AZ Power window regulator to inner door panel	F54 / F55			9,5 Nm
6AZ Flat motor to power window regulator	F60			4,5 Nm



51 41 Front door trim panel with armrests

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Door trim panel to door	R50 / R52 / R53			3 Nm
	R60 / R61			4,2 Nm
2AZ Carrier, door trim panel, to door	R55 / R56 / R57 / R58 / R59		Screw	8 Nm
			Nut	10 Nm
3AZ Handle recess on door trim panel	R60 / R61			1,5 Nm



5141 Overview of tightening torques

Door trim panel

4,2Nm



51 41 Rear door trim panel with armrests

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Door trim panel to door	R60			4.2 Nm



51 43 Side Trim Panel with Armrests

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Trim, front roof pillar (A-pillar) on body	R55 / R56			2 Nm
	R60 / R61			3 Nm
2AZ Trim panel, door pillar, top (B-pillar), to body	R55 / R56			2 Nm
3AZ Trim, rear roof pillar (C-pillar) on body	R55 / R56			2 Nm
4AZ Side trim panel to body	R56			2.5 Nm
	R55			1.8 Nm
	R58 / R59			1.1 Nm
	R61			5.2 Nm
5AZ Upper Clubdoor door post trim panel to body	R55			2 Nm
6AZ Wind deflector adapter to rollover bar	R59			4 Nm



51-1 45 Trim, instrument trim panel

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Instrument panel trim, screws to body	R50 / R52 / R53			48 Nm
2AZ Lower instrument panel trim, screws	R50 / R52 / R53			8 Nm
3AZ Instrument panel carrier to bulkhead, screws	R55 / R56 / R58 / R59	M10		34 Nm
	R60 / R61		Jointing torque Angle of rotation	22 Nm 90 °
4AZ Bracket, carrier to bulkhead, screw	R55 / R56 / R58 / R59			22 Nm
5AZ Trim, CD changer	R55 / R56 / R57 / R58 / R59			1.7 Nm
6AZ Retaining bracket to tunnel	R60 / R61			8 Nm
7AZ Support for dashboard to frequency strut (bulkhead)	R60 / R61			7.5 Nm
8AZ Retaining bracket to dashboard carrier	R60 / R61			7.5 Nm



51 49 Luggage compartment lid trim panel

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Rear window frame cover, on side	R60 / R61			1,3 Nm
2AZ Tailgate trim panel	R60 / R61			1,8 Nm



51 71 Gaskets and loose body components

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Wheel arch trim to body	R53 / R52 / R50			3 Nm
2AZ Tension strut to sill and tension strut fixture	R52 / R57 / R59	M10	Replace screws Jointing torque Angle of rotation	56 Nm 45 °
3AZ Rear spoiler to holder, rear spoiler	R53 / Amper			5 Nm
4AZ Holder, rear spoiler to tailgate	R53 / Amper			4 Nm
5AZ Load bar to retaining bracket	R53 / Amper			8 Nm
	R56 JCW GP	M8		18 Nm
6AZ Retaining bracket with counter-plate to body	R53 / Amper			12 Nm
	R56 JCW GP	Nut		20 Nm
7AZ Rear spoiler to tailgate	R56			4 Nm
	R60 / R61	NutM6		4 Nm
		Screw		1,5 Nm
8AZ Connection carrier to body	R55 / R56			19,5 Nm
9AZ Lashing eye to body	R55 / R56			6 Nm
10AZ Rear spoiler to roof	R55			4 Nm
11AZ Active spoiler on tailgate	R58 / R59	M6		2,3 Nm
12AZ Roof spoiler on tailgate	R58	M6		4 Nm
13AZ Luggage compartment grille on body	R55 Clubvan	M8	Screw	16 Nm
14AZ Barrier on luggage compartment grille	R55 Clubvan	M8	Nut	12 Nm
15AZ Fixing rod on luggage compartment grille	R55 Clubvan	M5		6 Nm



51 operating fluid overview

Expendable materials

Yellow plastic adhesive tape		83199410979
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Expendable materials

Adhesive tape, double-sided		54112290978
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Expendable materials

Cutting cord		81432344272
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Expendable materials

Cleaning agent R1	100 ml, Bottle	83192211217
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Expendable materials

Cleaning agent R2	500 ml	83190417324
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Adhesive

Window glass adhesive Rest of World	300 ml, Cartridge	83192289286
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Adhesive

Window glass adhesive USA	300 ml, Cartridge	83192289181
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Adhesive

Window glass adhesive CHN	300 ml, Cartridge	83192180002
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52 13 Front seats

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Seat to floor panel	R50 / R52 / R53 / R55 / R56 / R57 / R58 / R59	M8 x 40	Apply Loctite 270	35 Nm
	R60 / R61	(trilobular)	Replace Powerlock screw.	30 Nm
2AZ Handle for tilt adjustment and handle for entry aid	R50 / R52 / R53			6 Nm
3AZ Backrest frame to seat mechanism	R50 / R52 / R53 / R60		Apply Loctite 270	45 ± 2,5 Nm
	R55 / R56 / R57 / R58 / R59 / R61		Apply Loctite 270	38 ± 4 Nm
4AZ Bearing for lumbar handwheel	R50 / R52 / R53 / R55 / R56 / R57 / R58 / R59 / R61			1,5 Nm
5AZ Release handle for backrest release	R55 / R56 / R57 / R58 / R59 / R61			1,5 Nm
6AZ Nut for torsion spring	R55 / R56 / R57 / R58 / R59 / R61	M10	Self-locking	31 ± 4 Nm
7AZ Actuating unit for backrest release	R55 / R56 / R57 / R58 / R59 / R61	M5 x 12		3,6 ± 0,5 Nm
8AZ Operation, seat height adjustment	R55 / R56 / R57 / R58 / R59 / R61	M5 x 12		5,5 ± 0,5 Nm
	R60			3 Nm
9AZ Covers, inner and outer	R60			3 Nm



52 13 Front seats

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Seat to floor panel	R50 / R52 / R53 / R55 / R56 / R57 / R58 / R59	M8 x 40	Apply Loctite 270	35 Nm
	R60 / R61	(trilobular)	Replace Powerlock screw.	30 Nm
2AZ Handle for tilt adjustment and handle for entry aid	R50 / R52 / R53			6 Nm
3AZ Backrest frame to seat mechanism	R50 / R52 / R53 / R60		Apply Loctite 270	45 ± 2,5 Nm
	R55 / R56 / R57 / R58 / R59 / R61		Apply Loctite 270	38 ± 4 Nm
4AZ Bearing for lumbar handwheel	R50 / R52 / R53 / R55 / R56 / R57 / R58 / R59 / R61			1,5 Nm
5AZ Release handle for backrest release	R55 / R56 / R57 / R58 / R59 / R61			1,5 Nm
6AZ Nut for torsion spring	R55 / R56 / R57 / R58 / R59 / R61	M10	Self-locking	31 ± 4 Nm
7AZ Actuating unit for backrest release	R55 / R56 / R57 / R58 / R59 / R61	M5 x 12		3,6 ± 0,5 Nm
8AZ Operation, seat height adjustment	R55 / R56 / R57 / R58 / R59 / R61	M5 x 12		5,5 ± 0,5 Nm
	R60			3 Nm
9AZ Covers, inner and outer	R60			3 Nm



52 26 Rear seats (through-loading system)

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Lock to backrest	R55 / R56 / R57	M8 x 34		19 Nm
2AZ Central hinge, middle, to body	R55 / R56 / R57			29 Nm
3AZ Cover, central hinge, to backrest	R55 / R56 / R57	M4		2 Nm
4AZ Closing bar	R55 / R56			19 Nm
	R57			32 Nm
5AZ Fastening, striker -side to rollover bar	R57			18 Nm
6AZ Rear seat to floor panel	R60	(trilobular)	Replace Powerlock screw	45 Nm
7AZ Rear seat on heel plate (front)	R61		Apply Loctite to the screw.	41 Nm
8AZ Seat adapter on floor panel (rear)	R61			45 Nm
9AZ Seat rail on seat adapter (rear)	R61			56 Nm
10AZ Luggage compartment trim panel centre to cross member	R61			2 Nm
11AZ Wire frame to lower seat structure	R61			9 Nm
12AZ Backrest on lower seat structure	R60 / R61			45 Nm



52 26 Rear seats (through-loading system)

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Lock to backrest	R55 / R56 / R57	M8 x 34		19 Nm
2AZ Central hinge, middle, to body	R55 / R56 / R57			29 Nm
3AZ Cover, central hinge, to backrest	R55 / R56 / R57	M4		2 Nm
4AZ Closing bar	R55 / R56			19 Nm
	R57			32 Nm
5AZ Fastening, striker -side to rollover bar	R57			18 Nm
6AZ Rear seat to floor panel	R60	(trilobular)	Replace Powerlock screw	45 Nm
7AZ Rear seat on heel plate (front)	R61		Apply Loctite to the screw.	41 Nm
8AZ Seat adapter on floor panel (rear)	R61			45 Nm
9AZ Seat rail on seat adapter (rear)	R61			56 Nm
10AZ Luggage compartment trim panel centre to cross member	R61			2 Nm
11AZ Wire frame to lower seat structure	R61			9 Nm
12AZ Backrest on lower seat structure	R60 / R61			45 Nm



54 12 Components of the slide/tilt sunroof mechanism

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Tolerance compensation bar	R50 / R53	M6x25		5 Nm
2AZ Front and centre mounting	R50 / R53	M6x15		5 Nm
3AZ Mounting, height adjustment	R50 / R53	M6x25		5 Nm
4AZ Glass slide/tilt sunroof panel to mechanics	R50 / R53 / R56		Renew screws.	4 Nm
	R60 / R61 / F54 / F55 / F56 / F60	M5x6	Renew screws.	4,5 Nm
5AZ Slide/tilt sunroof frame to body	R56		Renew screws.	5 Nm
	R60 / R61 / F54 / F55 / F56 / F60		Renew screws.	6 Nm



54 12 Components of the slide/tilt sunroof mechanism

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Tolerance compensation bar	R50 / R53	M6x25		5 Nm
2AZ Front and centre mounting	R50 / R53	M6x15		5 Nm
3AZ Mounting, height adjustment	R50 / R53	M6x25		5 Nm
4AZ Glass slide/tilt sunroof panel to mechanics	R50 / R53 / R56		Renew screws.	4 Nm
	R60 / R61 / F54 / F55 / F56 / F60	M5x6	Renew screws.	4,5 Nm
5AZ Slide/tilt sunroof frame to body	R56		Renew screws.	5 Nm
	R60 / R61 / F54 / F55 / F56 / F60		Renew screws.	6 Nm



54 operating fluid overview

Brake fluid and hydraulic fluid

Hydraulic fluid for convertible top / lids	250 ml, Bottle	54340394395
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Expendable materials

Lubricating grease Renolit RHF 1	20 g, Bag	83192157321
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61 14 Distribution box, current terminals

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Battery cable Plus to B+ multifuse distributor	R55 / R56 / R57 / R58 / R59 / R60	M6		8 Nm ±1 Nm



61 13 Plug connectors

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Fuse box mounting bolts in engine compartment	R50 / R52 / R53 / R60 / R61			5 Nm
	R55 / R56 / R57 / R58 / R59	M6		5 Nm
	R60 / R61 / from 04/2015	M6x20 microencapsulated	Replace screws	3 Nm
2AZ Ground connection on left spring strut	R50 / R52 / R53			9 Nm
3AZ Ground connection on engine carrier	R50	M8		22 Nm
4AZ Battery cable to fuse box in engine compartment	R50 / R52 / R53 / R60 / R61			22 Nm
	R55 / R56 / R57 / R58 / R59	M8		8 Nm ± 0,5 Nm
5AZ Fuse box in the passenger compartment	R50 / R52 / R53			6 Nm
6AZ Battery cable to bridge connections - nuts	R53			13 Nm
7AZ Nut for safety fuse to bridge connection (top)	R53	M8		15 Nm



61 14 Distribution box, current terminals

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Battery cable Plus to B+ multifuse distributor	R55 / R56 / R57 / R58 / R59 / R60	M6		8 Nm ±1 Nm



6120 Overview of tightening torques

Battery terminal	
	5Nm



61 21 Battery with terminal

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Battery terminal	R50 / R52 / R53 / R55 / R56 / R57 / R58 / R59 / R60 / R61	M6		5 Nm
2AZ Upper retaining band/retaining bracket	R50 / R52 / R53	M6		6 Nm
3AZ Mountings/battery container	R50 / R52			8 Nm
4AZ Battery earth lead to bulkhead/body	R50 / R52 / R55 / R56 / R57 / R58 / R59 / R60 / R61	M8		19 Nm
5AZ Fuse box	R55 / R56 / R57 / R58 / R59 / R60 / R61	M8		15 Nm
	R55 / R56 / R57 / R58 R59 / R60 / R61	M6		8 Nm
	R55 / R56 / R57 / R58 R59 / R60 / R61	M5		5 Nm
6AZ Positive battery cable to B+ terminal	R55 / R56 / R57 / R58 / R59 / R60 / R61	M8		15 Nm



61 35 Control Units, Modules

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Control unit of electronic immobilizer	R50 / R52 / R53			2,8 Nm
2AZ Bracket to body	R50 / R52 / R53			9,0 Nm
3AZ Fanfare horn to bracket	R50 / R52 / R53			4,0 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61			9,5 Nm ± 1.5 Nm
4AZ Control unit for headlight vertical aim adjustment	R50 / R53			4,0 Nm
5AZ Interior aerial to body	R59			3,0 Nm
6AZ Roof operating facility	R55 / R56 / R60 / R61			2,0 Nm
7AZ FEM to body SPEG to body	R55 / R56 / R57 / R58 / R59 / R60 / R61			2,5 Nm



61 35 Control Units, Modules

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Control unit of electronic immobilizer	R50 / R52 / R53			2,8 Nm
2AZ Bracket to body	R50 / R52 / R53			9,0 Nm
3AZ Fanfare horn to bracket	R50 / R52 / R53			4,0 Nm
	R55 / R56 / R57 / R58 / R59 / R60 / R61			9,5 Nm ± 1.5 Nm
4AZ Control unit for headlight vertical aim adjustment	R50 / R53			4,0 Nm
5AZ Interior aerial to body	R59			3,0 Nm
6AZ Roof operating facility	R55 / R56 / R60 / R61			2,0 Nm
7AZ FEM to body SPEG to body	R55 / R56 / R57 / R58 / R59 / R60 / R61			2,5 Nm



61 61 WINDSCREEN WIPERS

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Windscreen wiper arm	R50 / R53 / R52 / R55 / R56 / R57 / R58 / R59	M8		20 Nm
	R60 / R61	M8		30 Nm
2AZ Wiper console mounting to bulkhead	R50 / R53 / R52 / R55 / R56 / R57 / R58 / R59	M8		22 Nm
	R50 / R52 / R53 / R55 / R56 / R57 / R58 / R59 / R60 / R61	M6		10 Nm
3AZ Fluid tank	R50 / R53 / R52 / R57			4 Nm
	R60 / R61			3,5 Nm



61 62 Rear wiper

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Wiper arm	R50, R53 up to 07/2004	M8		13 Nm
	R50 / R53 / R56	M8		11 Nm
	R55 / R60 / R61	M8		12 Nm
2AZ Rear wiper motor	R50 / R53 / R56	M6 x 30		10 Nm
	R55 / R60 / R61	M6 x 25		10 Nm



61 operating fluid overview

Expendable materials

Protective cover "Vehicle protection" picture panel		8319 2 350 087
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63 17 Fog lights, marker light
Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Fog light on bumper panel	R55 / R56 / R57 / R58 / R59 / R60 / R61			1,5 Nm



63 12 Headlight

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Headlight to front panel	R55 / R56 / R57 / R58 / R59 / R60			3,5 Nm
2AZ Xenon control unit to headlight	R55 / R56 / R57 / R58 / R59 / R60			1,0 Nm + 0.3 Nm
3AZ High-pressure nozzle to headlight	R55 / R56 / R57 / R58 / R59 / R60			1,5 Nm
4AZ Cornering light control unit to headlight	R55 / R56 / R57 / R58 / R59 / R60			1,0 Nm + 0.3 Nm



63 25 Brake light
Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Brake light on trim panel	R61			1,5 Nm



64 11 Heater and controls

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Nut, heating guide pin	R50, R52, R53	M6		7.5 Nm
2AZ Heating to lower instrument panel trim	R50, R52, R53			3 Nm
3AZ Heating to cross member	R50, R52, R53			4 Nm
4AZ Line / heating and air conditioning system to expansion valve	R50 / R52 / R53	M6 x 20		7.5 Nm
	R55, R56, R57 / R58 / R59 / R60 / R61			8 Nm
5AZ Clamping bolts to expansion valve	R50, R52, R53, R55, R56, R57 / R58 / R59 / R60 / R61			5.5 Nm



64 52 Compressor

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Compressor to engine	R50, R52, R53	M8		20 Nm
	R55, R56, R57 / R58 / R59			24 Nm
	R60 / R61	M8		19 Nm
2AZ Lines / A/C system to compressor	R50, R52, R53, R55, R56, R57 / R58 / R59	M8		20 Nm
	R60 / R61	M6		8 Nm



64 53 Condenser and dryer with lines

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Line connections to condenser	R50, R52, R53	M6		8 Nm
	R55, R56, R57 / R58 / R59 / R60 / R61	M6		12 Nm
2AZ Condenser to radiator	R50, R52, R53, R58 / R59	M6		6 Nm
3AZ Refrigerant collector/drier	R50, R52, R53			13 Nm
4AZ Safety pressure switch	R50 / R52 / R53 / R55 / R56 / R57 / R58 / R59 / R60 / R61			10 Nm
5AZ Refrigerant lines to double pipe	R55, R56, R57 / R58 / R59 / R60 / R61	M6		8 Nm



64 operating fluid overview

Expendable materials

Refrigerant R134a	12 kg, Bottle	83199408386
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Expendable materials

Heating and air conditioning system cleaning agent	1000 ml, Bottle	83192180507
	5000 ml, Bottle	83192219932

Expendable materials

Heating and air conditioning system cleaning agent	100 ml, Can	83192409611
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Expendable materials

Ozonizer	100 ml, Can	83192318666
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Expendable materials

Refrigerant oil PAG-Ä-L Denso ND8	500 ml, Can	81342147762
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Expendable materials

UV additive Waeco	500 ml, Can	83192232504
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Expendable materials

Cartridge set for leak detector case	3x , Cartridge	83192232569
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Expendable materials

Cleaning agent UV filter	237 ml, Spray bottle	83192243942
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Expendable materials

Refrigerant R1234yf	5 kg, Bottle	83192354790
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Expendable materials

UV additive	472,5 ml, Can	83192243934
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Expendable materials

Refrigerant oil Sanden SP-A2 * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only. EU	250 ml, Can	83222339920
	10 ml	83102287282

	10 ml, TU*	83192207302
Expendable materials		
Refrigerant oil * TU = Trade Unit. TU numbers cannot be ordered! For invoicing purposes only.	250 ml, Can	81229407724
	10 ml, TU*	83190143174



65 75 Anti-theft alarm system

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ tilt alarm sensor to holder	R55, R56, R57, R58, R59			7 Nm
2AZ Emergency siren to holder	R60, R61			3 Nm
3AZ Bracket to body	R60, R61			3,5 Nm



65 20 Roof aerial
Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Retainer to roof antenna	R55 / R56 / R57 / R58 / R59	M13 x 1.0		5 Nm
2AZ Roof aerial	R60 / R61	M13 x 1.0		4 Nm



65 75 Anti-theft alarm system

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ tilt alarm sensor to holder	R55, R56, R57, R58, R59			7 Nm
2AZ Emergency siren to holder	R60, R61			3 Nm
3AZ Bracket to body	R60, R61			3,5 Nm



65 77 Airbag control unit and airbag sensors

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Airbag control unit	R50, R52, R53			8.8 Nm
	R55, R56, R57, R58, R59			8 Nm
	R60, R61	M6		10 Nm
2AZ Sensor, door to door panel	R50, R52, R53		Replace screws	5.5 Nm
	R55, R56, R57, R58, R59, R60, R61		Replace screws	8 Nm
3AZ Sensor, B-pillar	R55, R56, R57, R58, R59, R60, R61		Replace screws	8 Nm
4AZ Acceleration sensor to engine support (upfront sensor)	R52, R55, R56, R57, R59 R60, R61	M6	Replace screws	8 Nm
			Replace screws	9 Nm



65 75 Anti-theft alarm system

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ tilt alarm sensor to holder	R55, R56, R57, R58, R59			7 Nm
2AZ Emergency siren to holder	R60, R61			3 Nm
3AZ Bracket to body	R60, R61			3,5 Nm



72 11 Seat belts

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Height adjuster, seat belt, front - to "B-pillar"	R50 / R53	M8		22 Nm
2AZ Front seat belt automatic reel - to "B-pillar"	R50 / R53		Replace screws.	29 Nm
	R52 / R55 / R56		Replace screws.	36 Nm
	R57		Replace screws.	31 Nm
	R60 / R61		Replace screws.	40 Nm \pm 4
	R58 / R59		Replace screws.	31,5 Nm
3AZ Deflection fitting - to height adjuster	R50 / R53	M10		36 Nm
- to body	R55 / R56	M10		36 Nm
	R58 / R59 / R60 / R61	M10		40 Nm
4AZ Front seat belt, end fitting; sliding rail	R50 / R52 / R53		Duo-Taptite screws are coated with microGLEIT DF 921 and must be replaced.	36 Nm
	R55 / R56		Duo-Taptite screws are coated with microGLEIT DF 921 and must be replaced.	36 Nm
	R57 / R58 / R59 / R60 / R61		Duo-Taptite screws are coated with microGLEIT DF 921 and must be replaced.	40 Nm
5AZ Rear seat belt automatic reel				
- outside to C-pillar	R50 / R52 / R53 / R55 / R56		Replace screws.	36 Nm
	R60 / R61		Replace screws.	40 Nm \pm 4
- middle to side belt retainer holder	R55		Replace screws.	36 Nm
Middle to roof	R60		Replace screws.	40 Nm
- to rollover bar	R57		Replace screws.	40 Nm
6AZ Belt deflection fitting for rear cabin seat belt - to "C-pillar"	R50 / R52 / R53 / R55 / R56			36 Nm
7AZ Rear seat belt end fitting	R50 / R52 / R53 / R55 / R56		Replace Duo-Taptite screw.	36 Nm
	R57 / R60 / R61		Replace Duo-Taptite screw.	40 Nm \pm 4
8AZ Buckle (lower strap), rear seat belt	R50 / R52 / R53 / R55 / R56	M10	Replace Duo-Taptite screw.	36 Nm
	R60 / R61		Replace screws.	40 Nm \pm 4
	R57		Replace Duo-Taptite screw.	40 Nm



9AZ Lower fitting (belt tensioner), seat belt, front	R50 / R52 / R53	M10	Replace screws.	45 Nm
	R55 / R56 / R57	M10	Replace screws.	36 Nm
	R58 / R59 / R60 / R61		Replace screws.	40 Nm
10AZ Seat belt guide loop to body (B-pillar)	R52 / R57			25 Nm
11AZ Belt guide loop	R52			11 Nm
12AZ automatic reel connection plate	R57			40 Nm
13AZ Belt deflection fitting for rear cabin seat belt -to rollover bar, front	R57			32 Nm
14AZ Belt deflection fitting for rear cabin seat belt -to rollover bar, side	R57			18 Nm
15AZ Belt deflector	R60 / R61		oval-head screw for thin sheet	5 Nm
16AZ Holder, automatic belt reel	R58 / R59			31,5 Nm
17AZ Cover belt deflection	R58 / R59			3 Nm



72 12 Gas generator, unit for passenger's side

Tightening Torques

	Type	Thread	Tightening specifications	Torque
1AZ Passenger airbag module - to instrument panel carrier	R50 / R53			10 Nm
	R52			3,3 Nm
- to dashboard	R55 / R56 / R57 / R58 / R59 / R60 / R61			9 Nm
2AZ Self-locking nut for gas generator - ITS head airbag	R50 / R53			6 Nm
3AZ Bracket for gas generator tube - ITS head airbag	R50 / R53			3,5 Nm
4AZ Fastening belt to A- and C-pillars - ITS head airbag	R50 / R53			11 Nm
5AZ Head airbag, retaining clip and panel to bracket - B-pillar Bracket, folding pack for head airbag and ramp, to body (B-pillar)	R50 / R53			6 Nm
	R56 / R55			8 Nm
6AZ Side airbag (front seat) to backrest frame	R50 / R52 / R53		Replace screw.	6 Nm
	R55 / R56 / R57 / R58 / R59 / R61		Replace screw.	6,5 ±0,5 Nm
	R60		Replace nut.	6,5 Nm
7AZ Holder, front passenger airbag to instrument panel carrier	R50 / R52 / R53 / R55 / R56 / R57 / R58 / R59 / R60 / R61			6 Nm
8AZ Head airbag screw points	R60 / R61			5 Nm
9AZ Front passenger airbag holder to airbag module	R55 / R56 / R57 / R58 / R59 / R60 / R61			9 Nm
10AZ Knee airbag to dashboard support	R60 / R61			9 Nm



83 operating fluid overview

Assembly aids

Lubricants G14	900 ml, Can	83232360412
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Adhesive

Adhesive set K6	25 ml, Tube	83192317925
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Expendable materials

Multifunction spray Brunox	400 ml, Spray can	83230418567
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99 operating fluid overview

Paints and colours

Emergency program base filler 2K spray	200 ml, Application time 8 h	51910432615
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Paints and colours

INOX spray welding primer	500 ml	83400409992
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Paints and colours

Spray paint, black matt	400 ml	51911900346
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Paints and colours

Paint spray aerosol, inside filler of spare wheel well	400 ml	51910411026
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Non-electrical diagnosis test modules: Important note on non-electrical diagnosis NED

Starting from **ISTA version 4.18**, the **NED test modules in ISTA** and **NED documents in AIR** are no longer available.

Individual scopes of NED are included in ISTA in der **electrical diagnosis** starting from version 4.18 (under "Current fault patterns") and in **PuMA/SIB**.

Going forward, new topics shall be published only via PuMA/SIB.



AM1101_00063 - Engine, noise

Brief description of the test module for non-electrical diagnosis:

Engine noise

Applies to:

R55, R56, R57, R58, R59, R60, R61

Engine: N12, N14, N16, N18

Content (excerpt):

- Squeaking noise when idle
- Squeaking noise depending on the engine speed
- Squeaking noise after switching on electrical consumers
- Grinding noise in the area of the timing chain
- Noise when starting the engine

Vehicle communication: Yes

ISTA path:

Activities / Information search / Non-electrical diagnosis / 01 drive / 01 noise / engine disruptive noise

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM1101_00597 - Engine, noise

Brief description of the test module for non-electrical diagnosis:

Engine noise

Applies to:

Engine: N55, N56

Content (excerpt):

- Clicking noise for approx. 10 s after cold start
- Increased exhaust noise after the cold start
- Rattling noise from the valve gear
- Squeaking noise after switching on electrical devices
- Hissing noise when pressing the brake pedal after shutting down the engine
- Whistling at idle speed
- Whirring / rattling from the area of the coolant line from 2000 rpm
- Clicking sound after the engine stop
- Clattering noise from engine compartment after the wake up of the Digital Motor Electronics

Vehicle communication: Yes

ISTA path:

Activities / Information search / Non-electrical diagnosis / 01 drive / 01 noise / engine noise

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM1101_00598 - Engine, noise

Brief description of the test module for non-electrical diagnosis:

Engine noise

Applies to:

Engine: N55, N56

Content (excerpt):

- Clicking noise for approx. 10 s after cold start
- Increased exhaust noise after the cold start
- Rattling noise from the valve gear
- Squeaking noise from the belt drive
- Squeaking noise after switching on electrical devices
- Hissing noise when pressing the brake pedal after shutting down the engine
- Whistling at idle speed
- Whirring / rattling from the area of the coolant line from 2000 rpm
- Clicking sound after the engine stop
- Clattering noise from engine compartment after the wake up of the Digital Motor Electronics

Vehicle communication: Yes

ISTA path:

Activities / Information search / Non-electrical diagnosis / 01 drive / 01 noise / engine noise

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM1104_00173 - Operating fluids leak from engine

Brief description of the test module for non-electrical diagnosis:

Engine operating fluid leak

Applies to:

R55, R56, R57, R58, R59, R60

Engine: N12, N14, N16, N18

Content (excerpt):

- Leak in the area of the top cylinder head cover
- Leak in the area of the front left / right wheel arch
- Leak in the area of the oil sump

Vehicle communication: No

ISTA path:

Activities / Information search / Non-electrical diagnosis / 01 drive / 04 vehicle fluid leaks / engine leaks vehicle fluids

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM2301_00033 - Gearbox/clutch noise

Brief description of the test module for non-electrical diagnosis:

Gearbox/clutch noise

Applies to:

R55, R56, R57, R58, R59, R60, R61

Content (excerpt):

- Buzzing noise from the gearshift lever
- Noise during gear shifting
- Ticktock noise during gear engagement at standstill or shifting while driving
- Rattling noise from the transmission at constant-speed driving
- Clacking noise / humming from around the transmission bearing

Vehicle communication: No

ISTA path:

Activities / Information search / Non-electrical diagnosis / 01 drive / 01 noise / Manual gearbox noise

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM2301_00285 - Manual gearbox noise

Brief description of the test module for non-electrical diagnosis:

Manual gearbox noise

Applies to:

BMW, MINI

Content (excerpt):

- Noise on engagement
- Creaking noise when operating the clutch pedal
- Noises when starting the engine
- Vibrations in the clutch pedal
- Noise when the engine is being switched off
- Whining when selecting lower gear

Vehicle communication: Yes

ISTA path:

Activities / Information search / NED / 01 Drivetrain / 01 Noise / Manual gearbox noise

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM2307_00116 - Clutch odour

Brief description of the test module for non-electrical diagnosis:

Clutch odour

Applies to:

R55, R56, R57, R58, R59, R60, R61

with manual transmission

Content (excerpt):

- Odour like burning clutch lining, on vehicles that have covered less than 1000 km

Vehicle communication: No

ISTA path:

Actions / information search / Non-electrical diagnosis / 01 Drive / 07 Odour / Clutch odour

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM3101_00080 - Front axle noise

Brief description of the test module for non-electrical diagnosis:

Front axle, noise

Applies to:

R55, R56, R57, R58, R59, R60, R61

Content (excerpt):

- Noise while driving

Vehicle communication: No

ISTA path:

Activities / Information search / Non-electrical diagnosis / 02 chassis / 01 noise / front axle noise

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM3201_00302 - Steering noise

Brief description of the test module for non-electrical diagnosis:

Steering noise

Applies to:

R55, R56, R57, R58, R59, R60

Content (excerpt):

- Noises while the vehicle is being driven
- Vehicles when stationary or when manoeuvring

Vehicle communication: No

ISTA path:

Activities / Information search / Non-electrical diagnosis / 02 chassis / 01 noise / steering system noise

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM3301_00311 - Rear axle differential noise

Brief description of the test module for non-electrical diagnosis:

Noise from rear axle differential

Applies to:

R60, R61

Content (excerpt):

- Metallic clacking noise when driving off
- Knocking noise during load reversal
- Groaning noise in the 1st gear, 2nd gear and reverse gear
- Permanent grinding noise
- Whining noise

Vehicle communication: Yes

ISTA path:

Activities / Information search / Non-electrical diagnosis / 01 drive / 01 noise / rear axle differential noise

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM3401_00329 - Brake noise

Brief description of the test module for non-electrical diagnosis:

Brakes, noise

Applies to:

F54, F55, F56, F57, F60, R50, R52, R53, R55, R56, R57, R58, R59, R60, R61

Content (excerpt):

- Squeaking noise in the area of the brakes
- Rattling noise in the area of the brakes
- Ticktock noise in the area of the brakes
- Groaning noise in the area of the brakes
- Groaning noise in the area of the brakes
- Scraping noise in the area of the brakes

Vehicle communication: No

ISTA path:

Activities / Information search / Non-electrical diagnosis / 02 chassis / 01 noise / Brakes noise

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM3401_00335 - Brakes, noise - Vehicle-specific

Brief description of the test module for non-electrical diagnosis:

Brake noise - vehicle-specific

Applies to:

R60, R61

Content (excerpt):

- Noise from around the brake

Vehicle communication: Yes

ISTA path:

Activities / Information search / Non-electrical diagnosis / 02 chassis / 01 noise / Brakes noise

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM3405_00467 - Brakes, optical complaint

Brief description of the test module for non-electrical diagnosis:

Braking, optical complaint

Applies to:

F54, F55, F56, F57, F60, R50, R52, R53, R55, R56, R57, R58, R59, R60, R61

Content (excerpt):

- Discolouration on the friction ring
- Corroded friction ring
- Scoring on the friction ring

Vehicle communication: Yes

ISTA path:

Activities / Information search / NED / 02 Chassis / 05 Optical complaints / Optical complaint regarding brakes

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM5101_00044 - Instrument panel, noise

Brief description of the test module for non-electrical diagnosis:

Instrument panel noise

Applies to:

R60, R61

Content (excerpt):

- Noises in the area of the top / centre instrument panel
- Noises in the area of the driver's side / passenger's side
- Noises in the interior mirror
- Noise from area of centre console

Vehicle communication: Yes

ISTA path:

Activities / Information search / Non-electrical diagnosis / 03 Body / 01 noise / instrument panel noise

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM5102_00035 - Door lock malfunction

Brief description of the test module for non-electrical diagnosis:

Door lock malfunction

Applies to:

E60, E61, E63, E64, E70, E71, E72, E81, E82, E83, E84, E87, E88, E89, E90, E91, E92, E93, F01, F02, F03, F04, F07, F10, F11, F12, F13, F18, F20, F25, F30, F31, F32, F33, F34, F35, F36, R60

Content (excerpt):

- Problems when opening / closing the door
- Problems when locking / unlocking
- CC message "Door open" when the door is closed
- Outside door handle malfunction

Vehicle communication: Yes

ISTA path:

Actions / Information search / Non-electrical diagnosis / 03 body / 02 Malfunction / door lock malfunction

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM5102_00472 - Tailgate malfunction

Brief description of the test module for non-electrical diagnosis:

Tailgate, malfunction

Applies to:

F55 ,F56 ,F60 ,R50 ,R53 ,R56 ,R58 ,R59 ,R60 ,R61

Content (excerpt):

- CC-Message "Tailgate open"
- Problems when opening / closing the tailgate

Vehicle communication: Yes

ISTA path:

Actions / Information search / Non-electrical diagnosis / 03 body / 02 Malfunction / tailgate malfunction

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM5201_00506 - Seat noise

Brief description of the test module for non-electrical diagnosis:

Seat noise

Applies to:

F60

Content (excerpt):

- Noise during seat adjustment
- Noises when the seats are loaded
- Noises below the seats
- Rattling noise from the head restraint on the rear seats

Vehicle communication: Yes

ISTA path:

Activities / Information search / Non-electrical diagnosis / 03 Body / 01 noise / seats noise

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM5403_00078 - Panorama glass roof water ingress

Brief description of the test module for non-electrical diagnosis:

Panorama glass roof, water ingress

Applies to:

R60

Content (excerpt):

- Various complaints about water ingress in the area of the panorama roof

Vehicle communication: Yes

ISTA path:

Activities / Information search / NED / 03 Body / 03 Water ingress / Panorama roof, water ingress

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM6303_90577 - Headlight fogging

Brief description of the test module for non-electrical diagnosis:

Headlight fogging

Applies to:

All BMWs and Mini
without F25

Content (excerpt):

- Headlight misted over
- Reflection of light source on the headlight lens

Vehicle communication: No

ISTA path:

Activities / Information search / Function structure / 05 Non-electrical diagnosis - NED / 03 Body / 05 Optical complaint / Front light combination, optical complaint

Important information:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



AM6401_00254 - Heating and air conditioning system noise

Brief description of the test module for non-electrical diagnosis:

Noise in the Integrated automatic heating/air conditioning system (IHKA)

Applies to:

R55, R56, R57, R58, R59, R60, R61

Content (excerpt):

- Noise when the blower is running
- Noise when changing the settings (e.g. air distribution, blower setting)
- Noise when the engine is running, with and without air conditioning operation

Vehicle communication: Yes

ISTA path:

Activities / Information search / Non-electrical diagnosis / 03 Body / 01 noise / heating/air conditioning system noise

Important note:

The fault patterns in the test module depend to some extent on the production period, optional equipment, motorisation and other features. It is therefore possible that not all content or different content to that described above may be displayed for different vehicles.



0 04 02 (937)

Workshop Equipment - Planning Documentation

Version 09/2002

Situation: 1.) The WEP CD (Workshop Equipment - Planning Documentation) has been revised. This CD version replaces the previous CD 08/2000.

2.) As pointed out in SWS2002-000202(877), workshop equipment has since 01.05.2002 been sold by the company Cartool. To this end Cartool offers a convenient way of ordering via the Cartool Internet Shop.

Procedure: 1.) You will automatically be sent the new WEP CD in the course of media allocation. Extra copies can be ordered where necessary from BMW Sales - Parts and Accessories (part number 01 69 0 026 085).

2.) For security reasons the Cartool Internet Shop can only be accessed by registered users with their name and password. Assignment of password: Please refer to Enclosure 1. The prices of the individual products are shown in the Internet Shop.

Note:

With regard to building and extending workshops, VS-23 can provide help and support in workshop and equipment planning.

The Service Information 0 02 00 (592) Workshop Equipment and Planning Documentation Version 08/2000 is no longer valid and must therefore be removed from the SI folder Special Tools and Equipment.

For a description of the WEP CD and the Cartool Internet Shop, please refer to Enclosure 1.



0 02 02 (877)

Workshop equipment sales

All

Situation: There will be a change in work equipment sales as from 01.05.2002. For harmonisation reasons we are combining the procedures and operations for special tools and workshop equipment. This means that, as is the case with special tools, advice, sales, order processing and invoicing will be handled by the Ingolstadt-based company Cartool, which has been working for BMW for around 30 years.

All the usual services, i.e. expert advice, complete handling such as shipping logistics, customs formalities, service in accordance with order processing, remain unchanged.

Procedure: Take advantage of our customary advice and place your order based on our Workshop Equipment CD (WEP 01 69 0 026 085) with Cartool at the familiar address:

CARTOOL GmbH Straußenlettenstr. 15D-85053 Ingolstadt

Contact: Claudia Ziesing, Tel.: +49-841/9650023 - Fax: +49-841/9610848 E-mail: C.Ziesing@cartool.de

Andreas Lang, Tel.: +49-841/9650024 - Fax: +49-841/9610848 E-mail: A.Lang@cartool.de



1 08 95 (965)

Release/pressing-off tool

From model year 94

Situation: Release and pressing-off tools are required for all the contact carriers and contacts fitted in the vehicle to enable repairs to the vehicle electrical system to be correctly carried out.

A tool kit, order no. 61 1 150, is presented and delivered by way of special offer for the first time with Service Information 1 03 89 (037).

See repair instructions 61 13.

The extended scope of electrical plug connections in the vehicle means that further tools are needed.

A new foam insert is available so that these tools can be arranged as a supplementary set in the tool box that has already been supplied.

Revised operating instructions are included with each supplementary set.

Procedure: Special offer tools are automatically dispatched in accordance with the present tools agreement.

Please refer to Enclosure 1.



2 08 95 (003)

Peripherals box, 26-pin

all models

Situation: Peripherals box 61 1 459 was introduced to the BMW dealer organisation in 1987 with SI 2 04 87 (783). As part of a technical update, high-quality, gold-plated measuring bushes have been introduced. This improvement now makes the peripherals box suitable for resistance measurements. The new peripherals box can be recognised from the green coloured ring on the measuring bushes.

With immediate effect, only the improved version will be supplied under order number 61 1 459.

Procedure: Store tools are intended for repair shops and are only supplied to order.



1 08 95 (965)

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Revised operating instructions are included with each supplementary set.

Procedure: Special offer tools are automatically dispatched in accordance with the present tools agreement.

Please refer to Enclosure 1.



11 00 Engine in general N18

Cylinder		4
Bore hole	mm	77,0
Stroke	mm	85,8
Effective displacement	cm ³	1598
Compression ratio	:1	10,5
Idle speed	rpm	650 ... 850
Nominal speed	rpm	4800
Max. permissible engine speed	rpm	6500
Compression pressure	bar	8...15
Compression pressure (maximum difference between cylinders)	bar	3



11 00 Engine in general N18 JCW

Cylinder		4
Bore hole	mm	77,0
Stroke	mm	85,8
Effective displacement	cm ³	1598
Compression ratio	:1	9,5
Idle speed	rpm	700 ... 850
Nominal speed	rpm	6000
Max. permissible engine speed	rpm	6500
Compression pressure	bar	8...15
Compression pressure (maximum difference between cylinders)	bar	3



11 11 Engine Block, Cylinder Crankcase N18

Bore hole \hat{a} ... ^{a)}	mm	77.000 ... 77.016
Permitted out-of-round of cylinder bore a)	mm	0.005
Permitted conicity of cylinder bore a)	mm	0.01
Permissible total wear tolerance between piston and cylinder (engine operated)	mm	0.10

a) *Newcondition*



11 12 Cylinder Head with Cover N18.

Inner diameter of installed valve guide	mm	5.000 ... 5.015
Running clearance between valve and valve guide		
Intake	mm	0.025 ... 0.047
Exhaust	mm	0.033 ... 0.060
Maximum running clearance between valve and valve guide		
Wear limit: Intake	mm	0.08
Wear limit: Exhaust	mm	0.10



11 12 Cylinder Head with Valve Seat Cover N18.

Valve seat angle	°	45
Correction angle: outer	°	15
Correction angle, intake: inner	°	60
Correction angle, exhaust: inner	°	75
Valve seat width: Intake	mm	0.8 ... 1.2
Valve seat width: Exhaust	mm	0.53 ... 1.03
∅ Valve seat		
Valve seat surface: Outside dia. inlet	mm	28.2 +0.1
Valve seat surface: Outside dia. exhaust	mm	24.3 +0.1



11 21 Crankshaft and Bearings N18.

Diameters of main journals	mm	44.984 ... 45.000
Radial play of main bearings	mm	0.026 ... 0.043
Radial play of main bearings (wear limit)	mm	0.070
Axial play of crankshaft	mm	0.015 ... 0.050
Axial play of crankshaft (wear limit)	mm	0.30



11 21 Crankshaft and Bearings N18.

Diameters of conrod bearing journals	mm	44.975 ... 44.991
Radial clearance of conrod bearings	mm	0.022 ... 0.066
Radial clearance of conrod bearings (wear limit)	mm	0.080



11 25 Pistons with Rings and Pins N18

1st groove		
End clearance	mm	0.20 ... 0.40
End clearance (wear limit)	mm	0.95
Side clearance	mm	0.015 ... 0.070
2nd groove		
End clearance	mm	0.30 ... 0.55
End clearance (wear limit)	mm	1.06
Side clearance	mm	0.015 ... 0.060
3rd groove		
End clearance	mm	0.10 ... 0.40
End clearance (wear limit)	mm	0.82
Side clearance	mm	0.040 ... 0.10



11 25 Pistons with Rings and Pins N18.

Piston and pin are paired to each other - replace together only.		
Measuring point "A" (position)	mm	10
Piston diameter at measuring point "A"		
Original (new dimension)	mm	76,949 ... 76,967
Piston running clearance	mm	0,033 ... 0,067
Permissible total wear tolerance between piston and cylinder (engine operated)	mm	0,10



11 31 Camshaft N18.

Diameters of bearings	mm	23.979 ... 23.995
Radial runout	mm	0.037 ... 0.073
Wear limit: Radial runout	mm	0.10
Side clearance	mm	0.040 ... 0.090
Wear limit: Side clearance	mm	0.25



11 34 Valves with Springs N18.

Valve clearance at max. 35°C coolant temperature		
Shaft diameter		
Intake	mm	4.9605 ... 4.9755
Exhaust	mm	4.9525 ... 4.9675



11 40 Oil supply R55 / N18 B16

Oil grades and consumption:		
see recommended engine oils for BMW Group engines		
Filling capacity, engine oil change with oil filter element	Liter	4,20



11 40 Oil supply R60 / N18 B16

Oil grades and consumption:		
see recommended engine oils for BMW Group engines		
Filling capacity, engine oil change with oil filter element	Liter	4,20



11 41 Oil Pump with Strainer and Drive N18.

Oil pressure at idle (engine at normal operating temperature)	min bar	0.7
Control pressure at 3000 rpm (engine at normal operating temperature)	bar	1.15 ... 6.45
Important: Comply with adjusted oil pump diagnosis instruction.		



17 00 Coolant, Cooling System Test R60 / N18

Model designation	Cooper S	JCW
Engine identification	N18 B16 M 0	N18 B16 T 0
Coolant quantity on vehicles with manual gearbox	5,5	6,0
Coolant quantity on vehicles with automatic transmission	6,0	6,5
Test pressure for cooling system (excess pressure)	1.5	1.5



17 11 Radiator with mounting R60 / N16 / N18

Cap for cooling system		
Pressure relief valve opens when the pressure exceeds the ambient pressure.	bar	1.4+0.1 0.1
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure	bar	0.1
Test pressure for cooling system (gauge pressure)	bar	2.0



17 11 Radiator with mounting R60 / N16 / N18

Cap for cooling system		
Pressure relief valve opens when the pressure exceeds the ambient pressure.	bar	1.4+0.1 0.1
Electric changeover valve must open at latest when the pressure is lower than the ambient pressure	bar	0.1
Test pressure for cooling system (gauge pressure)	bar	2.0



23 00 Transmission in general R55 / R56 / R57 / R58 / R59 / R60 / R61 / N18 GS6--53BG

Code letters/code on type plate or label:		
Refer to Electronic Parts Catalogue.		
Manual shift		
1st gear	3.308	
2nd gear	2.130	
3rd gear	1.483	
4th gear	1.139	
5th gear	0.949	
6th gear	0.816	
Reverse gear	3.231	



23 00 Transmission, general: R55 / R56 / R57 / R58 / R59 / R60 / R61

Oil grade:		
Up to 7/04 GS5-65 BH/SH	Litres	
From 7/04 GS5-52 BG(Getrag)	Litres	
Oil fill quantity for initial fill or repair transmission GS6-85 BG/DG (Getrag)	Litres	
Oil fill quantity for initial fill or repair transmission GS6-53 BG/DG	Litres	MAX 1.9
Oil fill quantity for initial fill or repair transmission GS6-55 BG	Litres	MAX 1.7



31 00 Front axle - ride height R60 All-wheel drive vehicle

Ride height in normal position:	
Attach tape measure to bottom middle of rim flange and measure to lower edge of wheel arch	
Tolerance ride height in	
-Normal position max±10 mm	
-Construction position max±2 mm	
Difference ride height between left/right in	
- Normal position 10 mm	
- Design position 2 mm	
Standard suspension	mm
16" wheel rim	618
17" wheel rim	633
18" wheel rim	646
19" wheel rim	658
Sport suspension	
16" rim	608
17" wheel rim	623
18" wheel rim	636
19" wheel rim	649



31 00 Front axle - ride height R60 / Front

Ride height in normal position:	
Attach tape measure to bottom middle of rim flange and measure to lower edge of wheel arch	
Tolerance ride height in	
-Normal position max±10 mm	
-Construction position max±2 mm	
Difference ride height between left/right in	
- Normal position 10 mm	
- Design position 2 mm	
Standard suspension	mm
16" wheel rim	618
17" wheel rim	633
18" wheel rim	646
19" wheel rim	658
Sport suspension	
16" rim	608
17" wheel rim	623
18" wheel rim	636
19" wheel rim	649



31 00 General - Track Width / Wheelbase R60

Track width for normal position and rim offset (ET)		
- ET 46	mm	1537
- ET 50	mm	1529
- ET 52	mm	1525
Wheelbase	mm	2595



32 00 Chassis/wheel alignment - normal position R60

Vehicle loaded in normal position	Vehicle with complete equipment for normal operation with: 2 x 68 kg on front seats (seats in central position), 1 x 14 kg in luggage compartment (centre) and full fuel tank.
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32 00 Wheel Alignment R60 Low-slung sport suspension

Observe test conditions		
Front axle:		
Total toe-in		0° 18' ±12'
Adjustment* total toe-in		0° 18' ±4'
Toe difference** single wheel between left/ right		max. 12'
Camber (difference between left/ right max. 30')		- 36' ± 30'
Adjustment* camber		- 36' ± 25'
Toe difference angle		(difference between left/right max. 30')
- with inner cornering wheel at 20° steering angle		-1° 24' ±30'
Castor		(difference between left/right max. 30')
Front wheel offset		0° 15'
Maximum steering angle		
- Inner cornering wheel	ca. °	36° 27'
- Outer cornering wheel	ca. °	30° 29'
Rear axle:		
Total toe-in		0° 20' ± 12'
Adjustment* total toe-in		0° 20' ± 4'
Camber:		-2° 06' ± 25'
Camber (difference between left/right max. 30')		
Adjustment* camber		-2° 06' ± 5'
Geometrical driving axis		0° ± 12'
*Note: To minimize adjusting errors (measuring inaccuracies), use a narrower tolerance for the toe/camber setting.		
**Note: Toe difference angle front axle = criterion for steering wheel inclination		



32 00 Wheel Alignment R60 Series

Observe test conditions		
Front axle:		
Total toe-in		0° 18' ±12'
Adjustment* total toe-in		0° 18' ±4'
Toe difference** single wheel between left/ right		max. 12'
Camber (difference between left/ right max. 30')		- 30' ± 30'
Adjustment* camber		- 30' ± 25'
Toe difference angle		(difference between left/right max. 30')
- with inner cornering wheel at 20° steering angle		-1° 24' ±30'
Castor		(difference between left/right max. 30')
Front wheel offset		0° 15'
Maximum steering angle		
- Inner cornering wheel	ca. °	36° 44'
- Outer cornering wheel	ca. °	30° 40'
Rear axle:		
Total toe-in		0° 20' ± 12'
Adjustment* total toe-in		0° 20' ± 4'
Camber:		-1° 45' ± 25'
Camber (difference between left/right max. 30')		
Adjustment* camber		-1° 45' ± 5'
Geometrical driving axis		0° ± 12'
*Note: To minimize adjusting errors (measuring inaccuracies), use a narrower tolerance for the toe/camber setting.		
**Note: Toe difference angle front axle = criterion for steering wheel inclination		



33 00 General - track width R60

Track width for normal position and rim offset (ET)		
- ET 46	mm	1564
- ET 50	mm	1556
- ET 52	mm	1552



33 00 Rear axle - ride height R60 / Front

Ride height in normal position	
Attach tape measure to bottom middle of rim flange and measure to lower edge of wheel arch	
Tolerance ride height in	
-Normal position max±10 mm	
-Construction position max±2 mm	
Difference ride height between left/right in	
- Normal position 10 mm	
- Design position 2 mm	
Standard suspension	mm
16" wheel rim	611
17" wheel rim	626
18" wheel rim	639
19" wheel rim	651
Sport suspension	
16" rim	600
17" wheel rim	615
18" wheel rim	628
19" wheel rim	641



33 00 Rear axle - ride height R60 / 4WD

Ride height in normal position	
Attach tape measure to bottom middle of rim flange and measure to lower edge of wheel arch	
Tolerance ride height in	
-Normal position max±10 mm	
-Construction position max±2 mm	
Difference ride height between left/right in	
- Normal position 10 mm	
- Design position 2 mm	
Standard suspension	mm
16" wheel rim	611
17" wheel rim	626
18" wheel rim	639
19" wheel rim	651
Sport suspension	
16" rim	600
17" wheel rim	615
18" wheel rim	628
19" wheel rim	641



33 10 Rear axle final drive 148AL

Use only approved final drive oils (refer to BMW Service Operating Fluids).		
Oil quantity	litre	0,45



33 10 Rear axle final drive 148AL

Use only approved final drive oils (refer to BMW Service Operating Fluids).		
Oil quantity	litre	0,45



33 10 Rear axle final drive 148AL

Use only approved final drive oils (refer to BMW Service Operating Fluids).		
Oil quantity	litre	0,45



34 .. Specifications for brake performance testing as part of regular periodic vehicle inspections as prescribed in § 29 StVZO German Motor Vehicle Safety Standards R60

Model series	R60
Base model	Cooper D
Remarks	Countryman
Approved gross vehicle weight (kg)	1575 kg
Maximum brake pedal force to achieve a deceleration rate of 58 % in (N)	170 N
Minimum front axle brake force ratio in %	54,8 %
Minimum proportion of rear axle braking force in %	19,3 %
Test area for brake pedal force (N)	70 – 150 N



34 11 Front Brake R60

<p>Important!</p> <p>New brake pads may only be fitted if the brake disc thickness is greater than the minimum brake disc thickness (MIN TH).</p> <p>Minimum brake disc thickness during general inspection (GI):</p> <p>Nominal size thickness minus 2.4 mm</p> <p>(Not applicable to perforated brake discs)</p> <p>Perforated brake discs:</p> <p>Nominal size thickness minus 1.6 mm</p> <p>Depending on:</p> <ul style="list-style-type: none"> - Engine type - Transmission version - Equipment specification (e.g. maximum load increase, chassis official-use, national version, etc.) <p>different brake discs can be fitted</p> <p>The brake discs must always be assigned by way of the relevant vehicle identification number and the Electronic Parts Catalogue!</p>		
Different thicknesses on brake linings	Max. mm	0,01
Surface roughness of braking surfaces (precision-turned)	Ra μ	0,5 ... 3,5
Max. machining dimension per friction ring side (perforated brake discs must not be machined). Brake disc minimum thickness (MIN TH) must not be undershot.	mm	0,8
Nominal size (diameter x thickness)	mm	294x22
Brake disk minimum thickness (MIN TH) stamped on brake disk body	mm	20,4
Nominal size (diameter x thickness)	mm	307x24
Brake disk minimum thickness (MIN TH) stamped on brake disk body	mm	22,4
Wear warning from residual lining thickness	mm	3,7



34 21 Rear Brake Discs R60

<p>Important!</p> <p>New brake pads may only be fitted if the brake disc thickness is greater than the minimum brake disc thickness (MIN TH).</p> <p>Minimum brake disc thickness during general inspection (GI):</p> <p>Nominal size thickness minus 2.4 mm</p> <p>(Not applicable to perforated brake discs)</p> <p>Perforated brake discs:</p> <p>Nominal size thickness minus 1.6 mm</p> <p>Depending on:</p> <ul style="list-style-type: none"> - Engine type - Transmission version - Equipment specification (e.g. maximum load increase, chassis official-use, national version, etc.) <p>different brake discs can be fitted</p> <p>The brake discs must always be assigned by way of the relevant vehicle identification number and the Electronic Parts Catalogue!</p>		
Different thicknesses on brake linings	Max. mm	0,01
Surface roughness of braking surfaces (precision-turned)	Ra μ	0,5 ... 3,5
Max. machining dimension per friction ring side (perforated brake discs must not be machined). Brake disc minimum thickness (MIN TH) must not be undershot.	mm	0,8
Nominal size (diameter x thickness)	mm	280x10
Brake disk minimum thickness (MIN TH) stamped on brake disk body	mm	8,4
Wear warning from residual lining thickness	mm	3,7



63 12 Headlight R55 / R56 / R57 / R58 / R59 / R60

Light bulb - xenon light	Type	D1S 12V 35W
Bulb - high beam / driving lights	Type	H4 12V 60/55W



63 13 Turn indicators R55 / R56 / R57 / R58 / R59 / R60 / R61

Light bulb - turn indicator, front	Type	P(Y)21W 12V 21W
Light bulb - side repeater	Type	W(Y)5W 12V 5W



63 14 Side clearance lights R50 / R52 / R53 / R57 / R58 / R59 / R60

Bulb	Type	12V 5W
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63 17 Fog light, additional headlight R55 / R56 / R57 / R58 / R59 / R60

Light bulb, front fog lights	Type	H8 12V 35W
Bulb, position light	Type	W5W 12V 5W



63 21 Rear light cluster R60, R61

Bulb - rear fog light (left rear light)/reversing light (right rear light)	Type	12V 21W
Light bulb - side lights	Type	12V 21W
Light bulb - turn indicator	Type	12V 21W
Light bulb - brake light	Type	12V 21W



63 26 Number plate light R55 / R60

Bulb	Type	W5W 12V 5W
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63 31 Interior lights R55 / R56 / R57 / R58 / R59 / R60 / R61

Interior roof light, front	Type	W6W 12V 6W
Interior roof light, rear	Type	W6W 12V 6W
Mirror light	Type	6V 1.2W
Luggage compartment light	Type	W5W 12V 5W
Footwell light	Type	W5W 12V 5W
Footwell light (front door)	Type	W5W 12V 5W
Glove box light	Type	C5W festoon 12V 5W
Socket lighting in front storage compartment	Type	12V 1.2W



64 50 Air conditioning, amount of refrigerant R55 / R56 / R57 / R58 / R59 / R60 / R61

Refrigerant capacity R 134a (The data on the nameplate in the engine compartment are definitive) Sourcing reference for refrigerant in Electronic Parts Catalogue	A	490 ± 10
Refrigerant fluid - type R 134a		Sourcing reference in Parts and Accessories Catalogue
All compressors	cm ³	Read and comply with notes on compressor replacement.



64 51 Heating and air-conditioning unit (evaporator), switching elements

Resistance as a function of temperature	°C/kΩ	-5/11.4 ... 11.9 0/8.8 ... 9.2 5/6.8 ... 7.2 10/5.3 ... 5.6 15/4.2 ... 4.5 20/3.3 ... 3.6 25/2.6 ... 2.9 30/2.1 ... 2.3 35/1.7 ... 1.9
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64 51 Heating and air-conditioning unit (expansion valve), switching elements

Inlet pressure (excess pressure)	bar	14
Outlet pressure (excess pressure)	bar	1.8
Leak test with detector at excess pressure	bar	1 ... 2

